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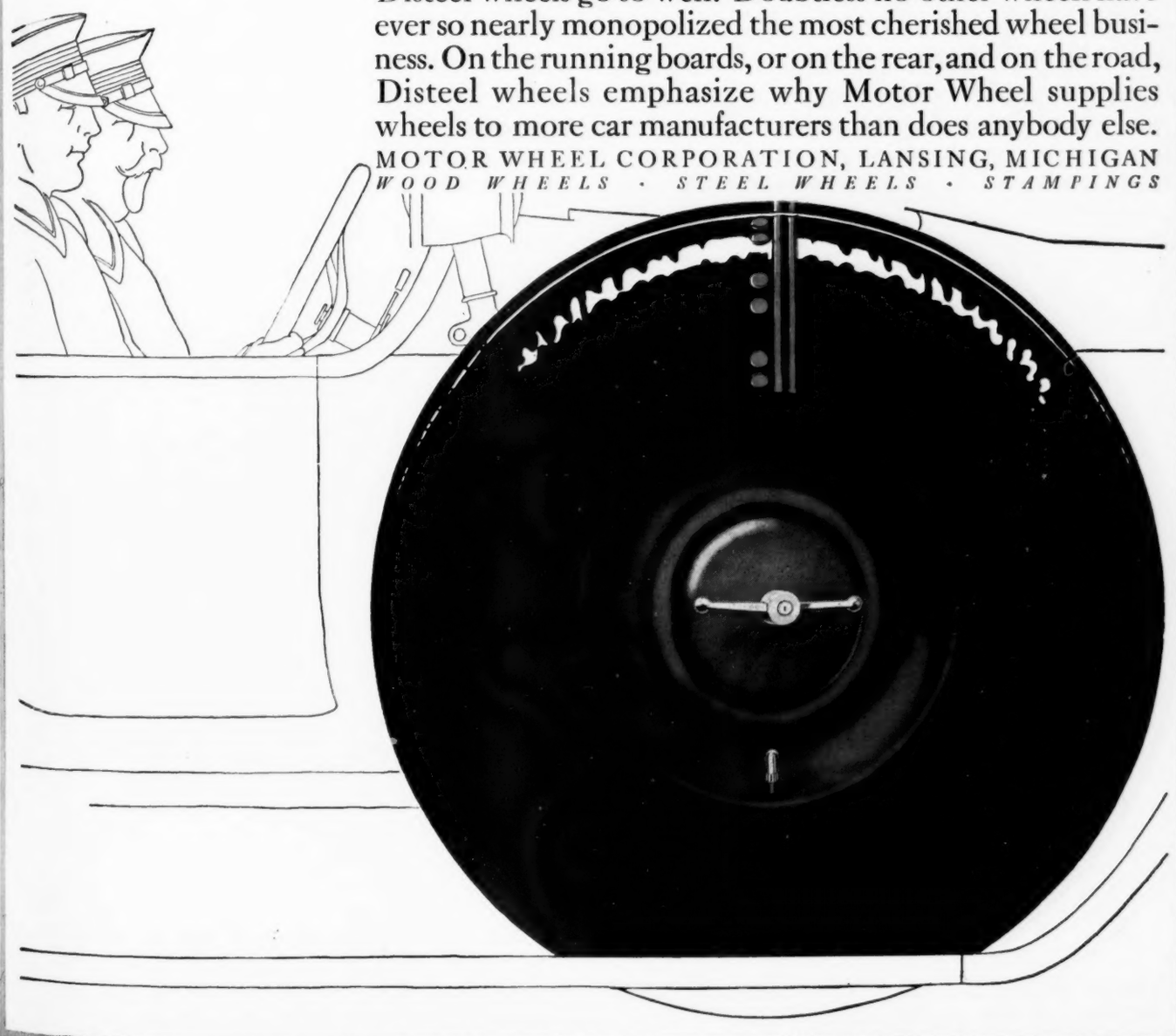

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AUTOMOTIVE INDUSTRIES
VOLUME 52 New York, Thursday, June 18, 1925 NUMBER 25

Spring Demand Holding Up Longer Than in Former Years

June business expected to be close to May level. Production still in step with sales. Credit situation one which manufacturers must meet. Used car stocks are moving.

By John C. Gourlie

AT the automobile factories today one finds an atmosphere of genial warmth exceeded only by the torrid rays of the sun itself. And the enthusiasm of executives and sales personnel is tempered a little by amazement, for sales have held up better than anyone dared to hope a few weeks ago.

After the record-breaking month of April, there was quite a slackening in demand from the field that was felt by nearly all the factories during the early weeks of May, and many feared that a serious slump was under way. Production was accordingly reduced, the manufacturers thus giving concrete evidence of their determination to keep output in step with sales. There were alarming predictions that the downward movement would be accelerated in June.

But today the feeling is much different. With the advent of real summer weather in most sections of the country late in May and continuing through this month, the decline was checked, and now the outlook is that, unless the situation changes overnight, June business will be close to the May level, despite the fact that several plants have closed down to prepare for new models.

There are, to be sure, rumors of more or less dyspeptic character afloat in the automotive atmosphere. This or that producer is described as hard hit and certainly facing bitter days. But a round of the factories in question fails to support the prophets of disaster, and one finds cars popping off the assembly line with accustomed regularity and the sales department confidently referring to reports from the field.

IT'S a queer picture that the industry presents and a hard one to explain. Automotive analysts are agreed that the saturation point has been reached in some sections of the country—not large sections, but large enough to enter into market calculations. And by saturation they mean the place where business must depend upon replacements and the natural increment of population. Furthermore, business the country over is by no means on a high plane, and in many important lines has been steadily declining of late.

Yet, in the face of these facts, and with 18,000,000 or so cars chugging about in the streets and highways, the public is continuing to absorb cars and trucks at the rate of about 400,000 a month. It is such considerations as these that upset the most carefully worked-out analyses, and render the rôle of the prophet a most undesirable one where automobiles are concerned.

However, just an ordinary prophet—a church-fair crystal gazer, for instance—ought to be able to predict that 1925, from the standpoint of earnings, should be one of the best the industry has seen.

NOTHING but an abnormal slump in sales, or a repetition of the errors of overproduction of former years could mar this outlook, and it is hard, indeed, to believe that either will occur. As the situation now stands, several factories in each of the price classes still are behind in meeting orders; stocks are at a minimum, and the public is eager for cars. Truck and bus sales, and foreign sales of all vehicles, are making new records, while the parts and accessory business is on a satisfactory level.

Could anything more be desired, as of the middle of June?

The clouds on the horizon are no bigger than a man's hand. This is not to say that the industry has no unsolved problems, but the fundamental problems do not appear to be of present moment.

Prices and time sales are the factors that require the most attention just now. The recent reductions were in the nature of a jockeying for position in anticipation of the keen competition to come. They were not so great nor so widespread as to cause much concern, but there is a possibility that they may lead

to a general slashing in which few will be benefited and all might be harmed.

There have been outstanding instances of companies attaining big scale production through heavy price reductions, and making a great deal of money thereby. But it must be obvious that there is a limit to which this policy could be carried, or we would have a hundred large scale, low price producers.

Price War Not Imminent

All things considered, however, a price war cannot be considered an imminent danger. Several of the largest concerns, it is known, do not feel that they could possibly benefit from further reductions, no matter how much production might be increased as a result. Their lists are already based on costs under big-scale output, and they are determined not to lower their prices unless costs of material decline sufficiently to warrant a lower scale. As to the latter point, there is a belief that some important material items are more apt to advance than to fall in the immediate future.

The public is disinclined to buy on a falling market, and those companies that act to stabilize prices will be in the debt of the industry as a whole.

The tendency to let down the bars on time sales, to make initial payments lower and to increase the months needed for completing the purchase, still is in evidence, though as yet there has been no unfavorable reaction. Money rates are lower, and it is likely they will further decline, marking the release of a great quantity of credit available for automobile financing.

It is admittedly bad business to permit sales to persons who cannot afford to own cars, who haven't the funds to buy them and who will probably default no matter how liberal the terms are made. Yet this is the direction that time sales are currently taking. Furthermore, the more liberal the sales terms the higher the ultimate cost to the consumer, and this violates rule No. 1 in the automotive code of business practice. Of what avail is it to fight high insurance rates and war taxes if large sums are to be added to the costs of financing?

This times sales problem is one that the automobile companies are eminently fitted to deal with. It cannot be left to the finance companies and the dealers. The manufacturers have shown their ability and willingness to cooperate on other questions vital to their business. Why cannot they get together on this one?

Signs of Cooperation

The matter of cooperation is receiving a great deal of attention these days. In the organization of the Guardian Trust Company and the Detroit Guardian Company, we see trade rivals gathered together in an imposing directorate. Despite the modest protestations of the participants in this enterprise, there is reason to believe that it represents a movement of considerable significance to the industry as a whole, one that may mean the easier and more profitable handling of the financial operations of automobile companies.

Not only the executives but the department heads of automotive concerns are displaying an eagerness to work together. The other day in Detroit, for instance, the statisticians of several leading factories met with the purpose of formulating plans for more uniform state registration reports. If state administrations can be brought to see the desirability of smoothing out inconsistencies in registrations, all the companies will be enabled to plan their operations better.

Another way in which the analysts could advantageously cooperate is in the preparation of tables showing the average number of times a car changes hands before it is scrapped. The need of a study of this sort is widely felt, but the work entailed is enormous, requiring a tracing back over a number of years of the changes of title filed with State departments.

Some sort of informal cooperation seems to have been exercised in attacking our old enemy, the used car problem. The manufacturers have all to some degree applied themselves to this time-honored bugaboo, and their efforts have in general followed these lines:

1. Keeping production on a sales basis, thus maintaining dealers' stocks at a low point and obviating the temptation to unbusinesslike used car operations.

2. Watching and warning dealers who show a tendency to wild trading.

3. Stressing used car questions at sales meetings and in booklets and bulletins, showing how proper accounting methods will often reveal hidden losses on used car business.

4. In one or two instances, manufacturers are endeavoring to fix for their dealers the wise proportion of used car to new car investment in their business. It is agreed that dealers should not have more than 25 per cent of their capital tied up in the trade-in part of their operations.

Used Car Situation

It is probably to a considerable extent due to these efforts that the used car situation is currently in fairly good shape, if the country is taken as a whole. There are other factors, however, more or less of a temporary nature. This year, for the first time, a notable proportion of the traded-in cars are of the closed types, as a consequence of the heavy production of closed models reached in 1923. The glut of open cars in the market is thus relieved.

Shortages in new cars in several popular lines also have helped. Another new factor is the wide use of quick-drying finishes, which enable a used car to be made to look like new in a comparatively short time. This influence, in the way of improving merchandising prospects for used cars, should be of a permanent character.

With all these influences at work, the manufacturers are able to report:

"Our dealers are all in fine shape, so far as used cars are concerned. Their stocks are low and they are eliminating losses in this end of the business."

But there is evidence that the ancient foe is not licked yet. Here and there one finds reports that stocks are increasing a little, and it is reasonable to suppose that with the end of the spring rush and the reduction in shortages, the situation will not have such a pleasant aspect.

Used car difficulties will tend to increase from the very nature of the market, unless efforts to overcome them are maintained at the peak of intensity. Automobiles produced in 1923, the record year, are now finding their way into the used car class. That was a year particularly of big volume production of cars in the $800 to $1,100 class, and they are now available at the prices of new cars in the lower-priced classes.

The tendency to reduce or eliminate yearly changes, and especially changes of a radical nature in body or chassis design, while a good thing in some ways, is increasing the attractiveness of used cars. This helps in the merchandising of old cars, but it may in time bear heavily on new car sales of cheap cars.

There are several ways of looking at the used car question, and they are all important:

1. As a manufacturers' problem of dealer education and production limitation.

(*Continued on page* 1060)

Counterweighted Crankshaft Among New Cunningham Features

Changes also made in axles, intake manifold and air heater. More space provided for tool box and battery. New radiator adopted. Perrot-Bendix four-wheel brakes.

By Donald Blanchard

CHIEF among a large number of refinements which have been made recently in the Cunningham passenger car chassis is a two-plane, counter-weighted crankshaft which puts its 90 deg., V-eight engine in inherent balance. In addition to the detailed mechanical changes in the engine, axles and other parts of the car, its appearance has been improved by the adoption of a new radiator design and Perrot-Bendix mechanical four-wheel brakes have been made regular equipment.

The arrangement of the crank throws in two planes at right angles to each other and the counterweights is shown in Fig. 1.

As a forging, the crankshaft is of particular interest for the reason that a considerable portion of the mass of the counterweights is integral with the shaft. Another unusual feature of this shaft is the manner in which the additional weights required to balance the inertia forces are attached.

As shown in Fig. 2, a large, tight fitting dowel takes all the centrifugal stress, two ½-in. screws being used merely to clamp the weights together. The dowel is locked against endwise motion by peening over the edges of the holes in the weights as shown.

The new crankshaft also has been made considerably stiffer torsionally, its main journal and crank pin diameters having been increased from 2¼ to 2¾ and 2⅝ in. respectively. To simplify adjustment for end play, crankshaft thrust now is taken at No. 1 bearing which is provided with a flange for the purpose. The pistons have been made ½ in. longer above the pin and a corresponding reduction has been made in the length of the connecting rod, which now is machined all over.

As the counterweights increase the amount of oil thrown on the cylinder walls, the pistons are fitted with an Indiana oil ring. For the same reason the longitudinal groove formerly cut in the connecting rod big end bearings has been replaced with a circumferential groove. Shimless bearings are being used and the main bearing caps have been strengthened by increasing the depth of the stiffening ribs on them. Due to the increased weight of the crankshaft, the flywheel has been lightened.

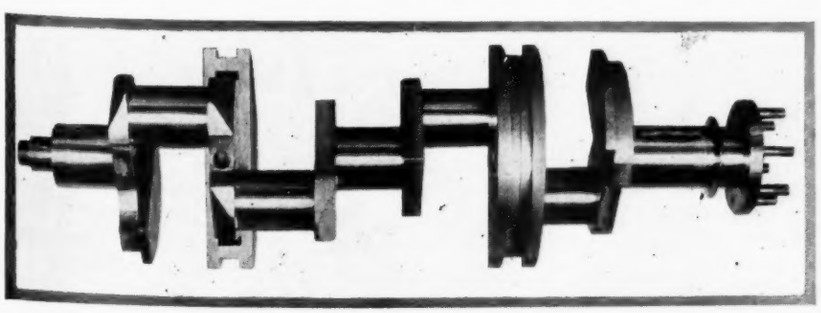


Fig. 1—The new Cunningham two-plane, counterweighted crankshaft

The engine now fires 1R, 5L, 4R, 8L, 6L, 3R, 7L and 2R and its valves are timed as follows: Inlet valve opens and exhaust valve closes 5 deg. after top center. The inlet closes 51 deg. after and the exhaust opens 41 deg. before bottom dead center. In addition, the valve lift has been increased from 5/16 to ⅜ in.

As in the past, the valves are operated through the intermediary of rocker levers. These levers are now bronze bushed at the rocker shaft and the cam rollers are fitted with hardened steel bushings. The end actuating the valve tappet has been provided with a renewable hardened steel button with an integral pin on its under side which fits into a hole in the rocker arm. The button fits between two lips forged on the top of the rocker lever and is locked in place by peening the edges of these lips. The valve spring length has been increased ⅛ in. and the cups formerly employed at their upper ends have been eliminated, the lower flange of the valve guide being used to center the spring. The face width of the timing gears has been increased 1/16 in.

T-Shaped Intake Manifold

A T-shaped intake manifold, which is more completely water jacketed, has replaced the Y-design used formerly. A change also has been made in the design of the hot air stove to muffle the noise at this point, the new construction being shown diagrammatically in Fig. 3.

The chassis has been cleaned up and more space provided for the tool box and battery by the elimination of one exhaust pipe and muffler. The two exhaust manifolds now discharge into a Y-connection to which a single exhaust pipe leading to the muffler is connected. Inasmuch as a dash gasoline gage is being furnished as regular equipment, the need for a reserve fuel supply has been eliminated and this feature is no longer incorporated in the gas tank.

The outlet connections of the water pump have been simplified and the provision for taking impeller thrust improved. The hose now connect directly to the outlet pipes instead of through flanged members as formerly. The bushing supporting the front end of the pumpshaft has been provided with a thrust flange and a self-lubricating washer is installed at its forward end.

No changes have been made in the multiple disk clutch or transmission except that the speedometer drive, which is taken from the tail shaft of the latter unit, now is fully enclosed.

The rear axle differs from the unit used

in the past chiefly in the method of supporting the pinion-shaft. The new construction is shown in Fig. 4. The shaft is supported in two opposed taper roller bearings forward of the pinion and in a Hyatt roller bearing aft. The arrangement of the taper roller bearings provides for thrust in both directions and provision is made for wear adjustment. The position of the pinion with respect to the ring gear may be altered by removing or introducing shims between the differential carrier and a flange on the sleeve carrying the two opposed roller bearings.

Front Axle Elliott Design

The front axle is now a reverse Elliott design with ball thrust bearings and transversely inclined king pins.

The reduction ratio of the steering gear has been increased from 8½ to 1, to 11½ to 1, this change having been made to provide easy steering with the 33 x 6.75 in. balloon tires which are offered as standard equipment. The front end of the torque arm now has a fabric support, and the frame has been stiffened by the addition of a tubular cross member at its front end. Supports for the front bumper are provided as an integral part of the front spring horns. The diameter of the spring eyebolts has been increased to ¾ in. from ⅝ in.

Another change is in the suspension of the power plant which is now carried by pressed steel brackets riveted to the frame side rails, the wood block construction used formerly having been discarded.

The four wheel brakes are of the Bendix-Perrot three shoe servo type and are said to multiply the pressure applied at the pedal by over 2½ times. The hook-up of the operating links is shown in Fig. 5 and it will be noted that no equalizers are used and that all four brakes are applied when either the pedal or hand lever is used. All brake rods are straight and consequently are subject only to tension. The layout shown is diagrammatic in that the connection to each front brake consists of two rods, the adjacent ends of which are supported by an idler lever.

Fig. 2—Method of fastening counterweights in crankshaft

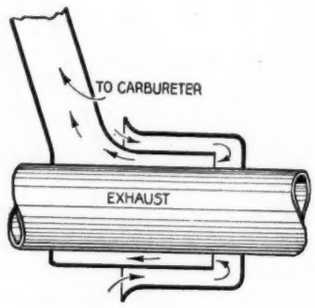


Fig. 3—Diagram showing new construction of air heater

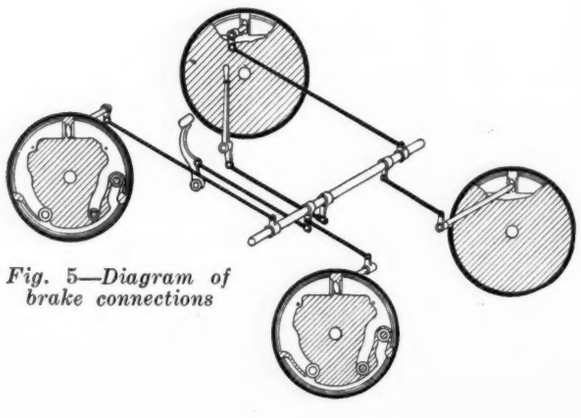
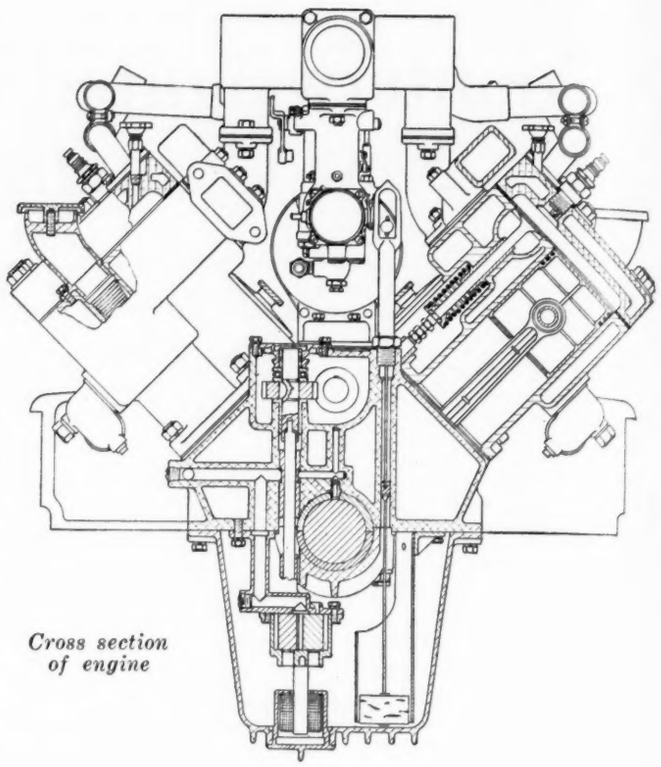


Fig. 5—Diagram of brake connections



Cross section of engine

The brake cross shaft is unusually stiff, being made of 1⅜ in. outside diameter, seamless steel tubing with a wall thickness of 7/32 in. All levers are keyed and clamped to this shaft and its ends are supported in self-oiling bearings mounted in spherical housings as shown in Fig. 6. This provides free motion under any condition of frame distortion and the shaft itself shows no perceptible deflection under any load the driver can exert. The stiffness of this shaft together with the fact that the rods are of large section and are under tension only, means that small motions of the pedal or hand lever will result in proportional movement of the cams.

Extra Travel for Hand Brake

The hand brake lever is designed so that when the brake pedal is down against the floor, there still is 25 per cent of effective travel in the hand lever. The leverage between the cross shaft and the cams is arranged so that the mechanical advantage on the rear brakes is 1.85 to 1 as compared with 1.65 to 1 on the front brakes. Consequently there is little tendency to lock the front wheels

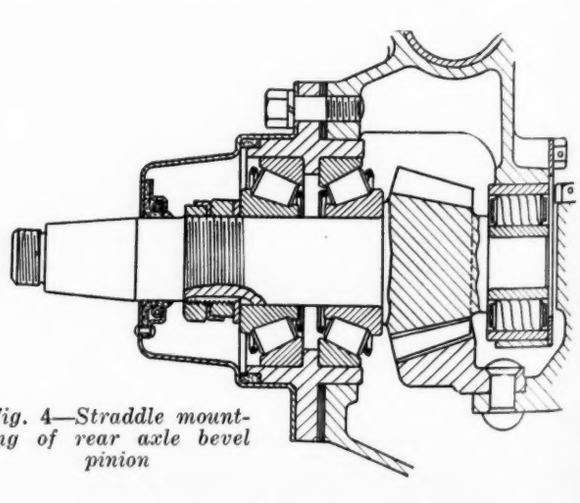
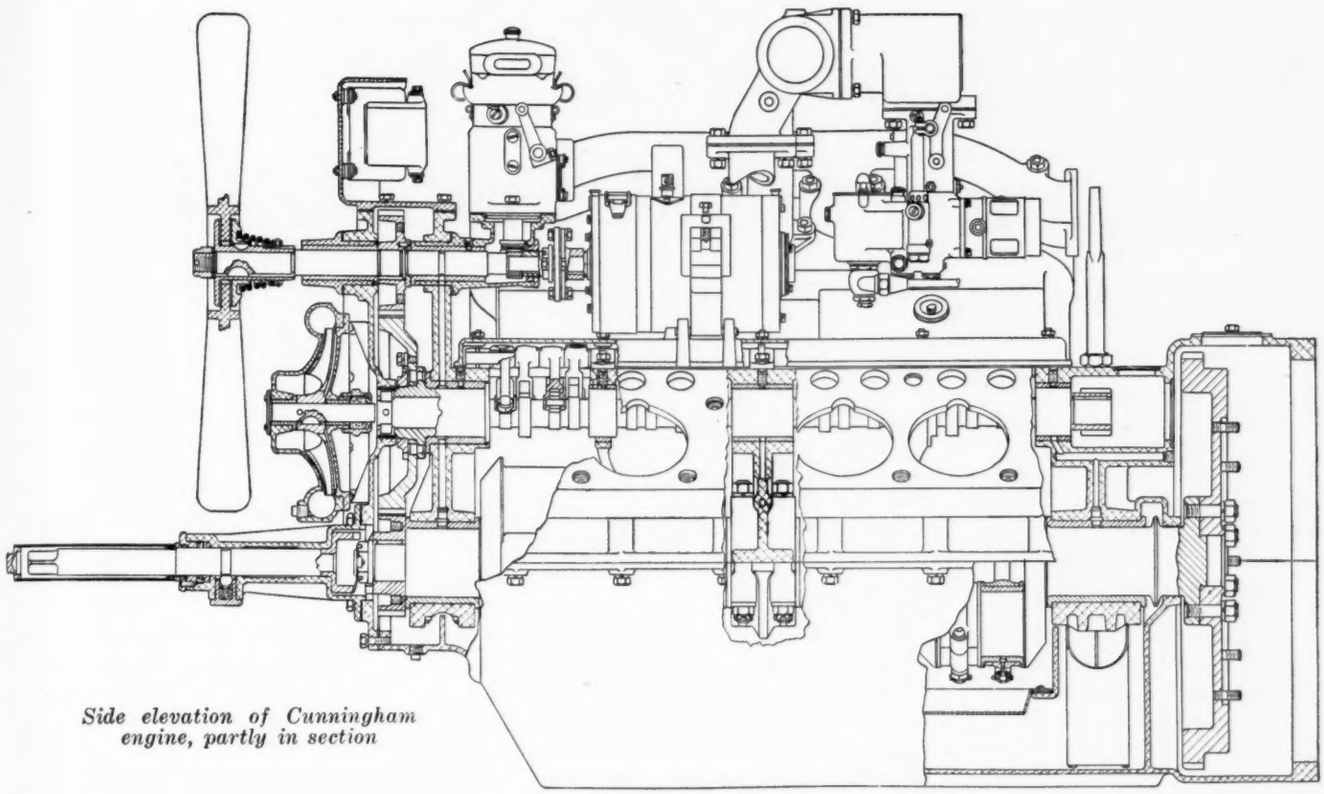


Fig. 4—Straddle mounting of rear axle bevel pinion



Side elevation of Cunningham engine, partly in section

and in addition the system has the Perrot characteristics of releasing one front wheel on making a turn.

Although one set of brakes is used for service and emergency, adequate safety is provided as, should the rods leading to one, two or three brakes fracture, the intact rods would still function. It is altogether improbable that all four brake rods would fail simultaneously or that

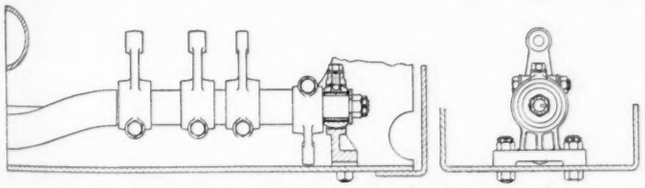


Fig. 6—Mounting of Cunningham brake cross shaft

connections from the pedal and hand lever to the cross shaft would both break.

Brakes are easily adjusted to give equal retarding effects on each wheel by jacking up the car and adjusting the nuts on the extreme ends of each brake rod until the pull measured by the spring scale is equal on each wheel, the spring scale being attached at the same distance from the wheel center in each case. The brake drums are of high carbon steel and have a stiffening flange.

Germany Pushing Standardization

IN order to promote standardization of parts and reduction in number of types, the German automobile industry plans to put its standardization program on a broad basis and at its meeting on March 10 it decided upon the organization of a Sectional Standards Committee which is to have among its members representatives of producers, consumers and of scientific institutions. Under this Sectional Committee are to work a number of subcommittees.

According to a report made at the meeting mentioned by the secretary of the German Automobile Manufacturers' Association, standardization of automobile parts has been carried to such a point that Jan. 1, 1927, has been suggested to the Government and large consumers as the date for the final adoption of the standards. In order to obviate all possibility of misunderstanding, it was pointed out that adoption of the standards is not to be made one of the conditions for permitting the use of vehicles on the public roads, and all idea of legal enforcement has been abandoned. But the large consumers (which probably means the Post Office and the organized motor traffic undertakings) have agreed among themselves that after the date mentioned they will purchase only vehicles built in accordance with the motor vehicle construction standards.

The Government and the large users agreed with the manufacturers that the greatest care must be exercised in the standardization of assemblies, in order that technical progress may not be hampered. This view was concurred in by Professor Becker of Charlottenburg Technical University who, as representative of scientific institutions, made the point that at the present time only materials of construction and machine elements are ripe for standardization. In his opinion, German standardization does not meet present conditions, but amounts practically to a state of overstandardization.

The representative of the Minister of Transport said that the large users were very anxious that tire dimensions should be unified.

After full discussion the following subcommittees were appointed: General Standardization (this subcommittee is to check the existing standards sheets with respect to their suitability under present conditions and to take up the new items listed under No. 9 in the general working program), Materials of Construction, Wheels and Tires, Accessories, Bodies, Motorcycles.

In connection with motorcycles the chief problems of standardization relate to screw threads and tubing for frames. Both producers and consumers are represented on all subcommittees.

Some recent work on
Unconventional Transmissions

Last few years have seen numerous developments along this line but none of them as yet has been accepted for general service to replace the sliding pinion type

By P. M. Heldt

THIS article—a thorough, technical study of the work that has been done in the last few years in an effort to improve existing methods of engine torque conversion—is a condensation of a paper on the subject which was read this week by Mr. Heldt at the Summer Meeting of the S.A.E.

Owing to the considerable volume of space required to properly cover such a comprehensive subject, the paper has been divided into two parts, of which this is the first.

The second part will appear in the Annual Engineering Issue next week, at which time Automotive Industries will devote an entire section to the other papers and discussions coming out of the S.A.E. Summer Meeting.

THE development of a transmission gear by means of which the engine torque can be transformed or converted at any ratio desired, between limits, has long been considered an oustanding automotive problem, partly because continuous variation of the ratio is practically a pre-requisite to automatic variation in accordance with the resistance to motion.

Practice has largely standardized on the sliding pinion change speed gear with selective control and with direct drive on high gear. The most satisfactory feature of this transmission is the direct drive on high gear. In fact, when operating in high gear or on direct drive, such a transmission leaves very little to be desired. Of course, some of the gears are in mesh while the gear is in direct drive, though not transmitting any power, and may possibly cause a noise to which the very fastidious might object, but this can be almost entirely eliminated by grinding the gears and carefully fitting the bearings. Also, there is a slight loss of power due to the churning of the idle gears in the lubricant, but there appears to be little chance of improving upon the efficiency of the sliding pinion change gear operating in direct drive.

Objections that may be raised against the sliding pinion gear are that shifting of the gears calls for a certain amount of skill which some drivers, particularly elderly persons and women, never acquire, and that the gears are apt to become noisy through wear.

Many American car manufacturers seek to overcome these objections by providing their cars with such powerful engines that on hard roads all driving can be done on direct drive and the lower gears are used only in starting. The irksome gear shifting is thus practically eliminated and if the transmission is noisy on the lower gears this noise has to be endured only for short periods at comparatively long intervals. Of course, the lower gears can be made to operate quietly, but this is rather expensive, and, naturally, the manufacturers of low priced cars cannot do very much in this direction, for which reason they seem to seek the solution of the problem in the provision of increased engine power and less use of the lower gears.

With the average American car on improved roads more than 95 per cent of the driving is done on high gear, because this gear is the most satisfactory from the standpoint of quiet operation as well as from that of engine efficiency. But in order to make it possible to do practically all driving on high gear the high gear reduction is made considerably larger than it would otherwise be made.

Let us consider for a moment that we had available a transmission with which we could obtain a very wide variation in ratio and which was equally satisfactory from the standpoints of quiet operation and wear no matter what the ratio. In that case the factor that would determine the optimum ratio would be the fuel economy.

The thermal efficiency of a gasoline engine in a general way increases with the load on the engine. Of course, an increase in load may be brought about by an increase in the torque, an increase in the speed or an increase in both. The most effective way of increasing the thermal efficiency is by increasing the torque, because increased torque means increased charge volumes and increased compression. Increase in speed results in an increase in economy up to a certain point, beyond which the economy decreases again.

In Fig. 1, which is based on test results from a large size six cylinder passenger car engine, there are shown two sets of curves which bring out very clearly the conditions of operation under which the thermal efficiency or the fuel economy is the highest. Very comprehensive test figures were published, including figures of specific fuel consumption covering the whole operating range under full, one-third and one-sixth throttle, and these latter were interpolated so as to obtain lines or curves of equal specific fuel consumption.

Referring to the chart, it will be noticed that torque is plotted along the vertical axis and speed along the horizontal axis. Any point within the area bounded by two straight and two curved lines represents a speed-torque combination at which the engine can be operated. The curved boundary line at the top of the area is the full throttle torque curve; the straight line at the right is the line of the maximum speed at which it is safe to run the engine; the straight line at the bottom, which lies in the horizontal axis, is the idling or no-torque line, and the curve at the left shows the variation of the minimum speed with the torque on the engine.

Ranges of Engine Operation

Each full line curve within this area represents a range in engine operation for which there is no change in fuel economy or in the fuel consumption per horsepower-hour!

A second set of curves in the chart, in dotted lines, represent conditions of equal power output. These curves are hyperbolæ, the products of the horizontal and vertical coordinates of all points along any curve being the same.

For operating a car of given weight under any given conditions a certain horsepower is required, and if we had a continuously variable transmission we could operate the engine at any point along the corresponding "equal horsepower" curve, that is, we could operate the engine either at high speed and low torque or at low speed and high torque, or at some intermediate point.

By referring to the chart it will be seen that as we follow an equal horsepower line in the direction from high to low speed, that is, from right to left, we cross or approach lines of lower specific fuel consumption or higher fuel economy. We thus obtain a line of maximum fuel economy which starts on the full throttle torque line at the point at maximum power, follows that line to the point of minimum speed of stable running and then follows the line of minimum operating speed to the horizontal axis. In practice, of course, it might be inadvisable to go all the way to the minimum speed of operation corresponding to any horsepower, as the engine will undoubtedly run smoother at a somewhat higher speed, but the principle can be set down that for maximum fuel economy, as long as the throttle is not fully opened, the engine should run near its minimum speed of stable operation.

The improvement in fuel economy with decrease in speed is particularly pronounced at high horsepower. It will be seen, for instance, that the 70 hp. curve crosses the equal economy curves at a very pronounced angle, whereas the 5 hp. curve runs substantially parallel to the equal economy curve.

In order to be able to take full advantage of the increase in fuel economy with decrease in speed for equal horsepower, we need a continuously variable gear, instead of a gear giving only two, three or four changes (a so-called stepped gear). Many types of continuously variable transmission have been proposed and some have been used on motor cars. Most of the simpler ones probably would be regarded today as commercially impractical.

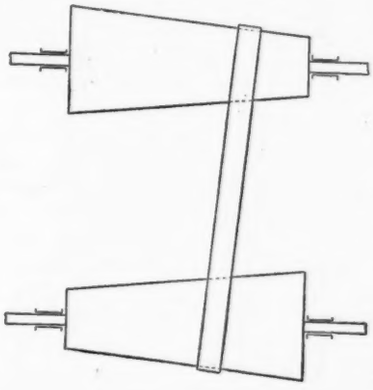


Fig. 2 — Transmission by truncated cone pulleys and belt

There is first the belt drive in which the belt runs over two truncated cones instead of over the usual type of stepped pulleys, as shown in diagram in Fig. 2. By shifting the belt in the direction of the pulley axes, the speed can be varied continuously. Then there is the expanding pulley transmission which was a great favorite with inventors in the automobile field in the early years and is now being used to some extent for industrial purposes. The driving and driven pulleys are so designed that their effective diameters can be varied, and the mechanisms for effecting this variation are inter-connected so that one pulley will increase in diameter at the same time the other decreases. The belt used with such expanding pulleys is usually of the link or block type. Fig. 3 illustrates a transmission of this type.

The ordinary friction disk and wheel, as shown in Fig. 4, is capable of giving any reduction ratio between its limits, which are generally very far apart. It is generally admitted that it is impractical to shift the wheel relative to the disk while the device is under load, as the shifting force would have to be greater than the tangential force at the rim of the wheel. In practice, when it is desired to vary the ratio, the disk is first moved out of contact with the wheel, then the wheel is slid along its shaft and finally the disk is brought into contact with the wheel again. Hence, in this case there is an interruption in the drive and changes really take place in steps, although any desired ratio between the limits can be obtained.

Another frictional transmission with continuous variation is illustrated in Fig. 5. This comprises two opposing

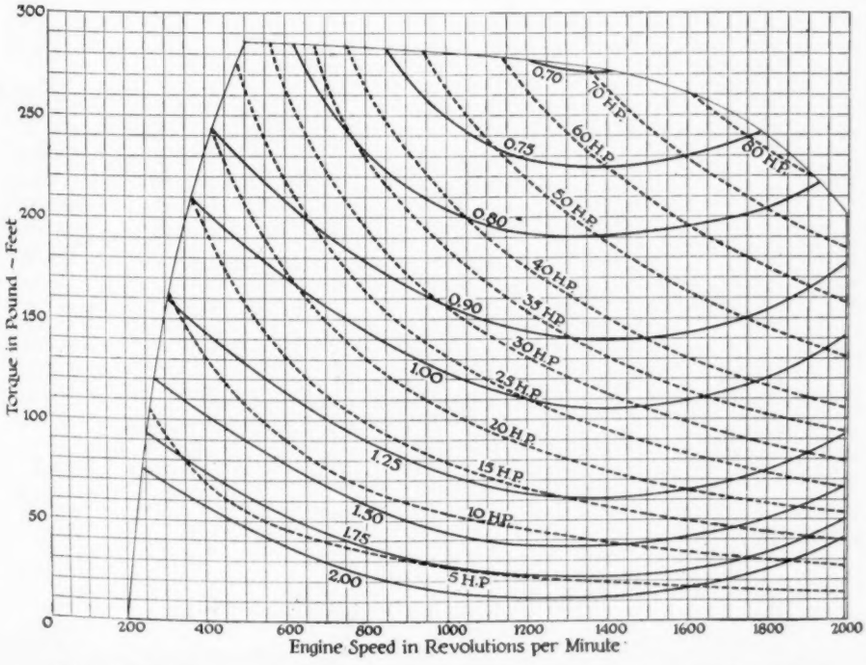


Fig. 1—Equal economy and equal horsepower curves of automobile engine

friction disks with curved friction surfaces, between which one or more wheels are interposed which transmit motion from one disk to the other. By swinging the axis of the wheel around a central point the surface of contact can be brought nearer to the axis of one disk and farther away from the axis of the other, thereby changing the ratio. Shifting under load is equally difficult with this as with the disk and wheel type.

Friction transmissions generally are considered practical only for the transmission of small powers. While they were used in this country to a limited extent for many years and are now being used in Europe on some machines of the cyclecar type, there seems to be little chance that they will play any important part in automobile construction in the future, because for efficient service they must be made quite bulky. Besides, they are easily damaged by unskilled handling.

In some forms of continuously variable gear the gear ratio is variable without limit in one direction. Thus, theoretically at least, an infinite multiplication of the torque and an infinite reduction of the speed can be obtained. From the torque point of view this is of doubtful value, because the limited adhesion of the rear wheels to the road surface sets a limit to the torque which can be utilized. However, from the speed standpoint there is a real advantage in this feature, as a car with such a transmission can be made to crawl at any speed desired, the same as a steam car, for instance. A further advantage is that a transmission of this type makes it unnecessary to use a friction clutch, for the reason that when the transmission is set for an infinite ratio there is no transmission of motion and the car remains stationary with the engine running.

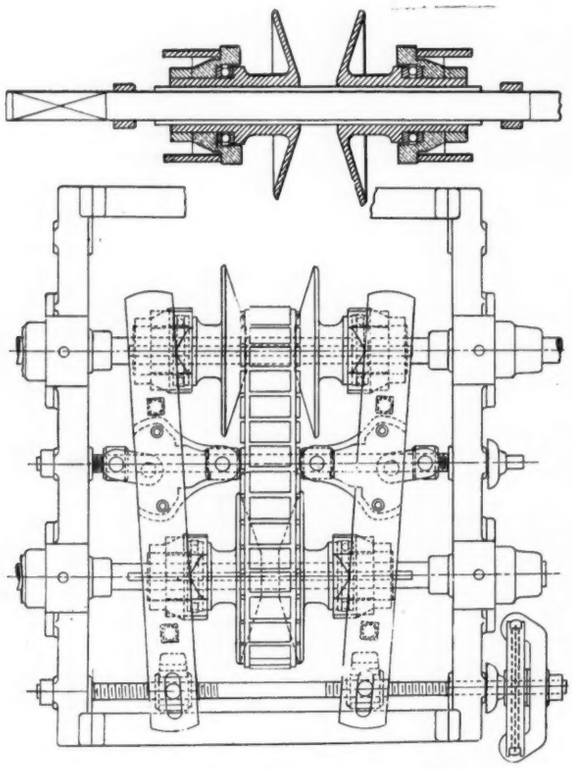


Fig. 3—Expanding pulley transmission

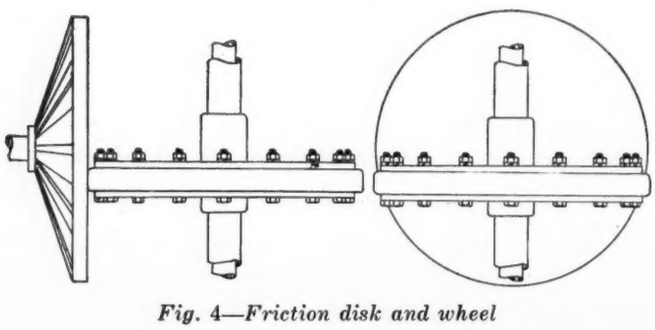


Fig. 4—Friction disk and wheel

Mechanical Drag Devices

A good many patents have been issued on what may be called mechanical drag devices, with a view to their use as automobile transmissions. If we take a friction clutch of comparatively large size we can, by allowing it to slip more or less, get any speed reduction we want, but what makes such a device unsuitable for an automobile transmission is that we get no increase in torque. The torque on the driven member is the same as that on the driving member and if the speed is reduced to, say, one-half by slippage, then the power received by the driven member is only one-half that delivered by the driving member, the other half being lost in friction.

The transmissions generally proposed are of the differential gear type, and Fig. 6 is a design on which a patent was issued in 1923. This is a regular bevel gear differential assembly, one side gear being used as the driving and the other as the driven member. There is a band brake on the differential housing and if this brake is applied so as to hold the housing against rotation, the driven shaft will be caused to turn at the same speed as the driving shaft but in the opposite direction. This corresponds to forward motion of the car.

The inventor says: "It will be understood that the forward speed of the driven shaft may be readily varied and controlled by varying the braking force applied to the spider." This, of course, is true, but exactly the same effect would be obtained by allowing the ordinary friction clutch to slip.

Aside from mechanical drag, the principles of magnetic drag and hydraulic drag also have been employed in transmissions designed for automobile use, but these devices all suffer from the same disability, that they give no increase in torque to make up for loss in speed and therefore are very inefficient at low speeds. An example of the hydraulic drag type is the Radcliffe, which was made in New York some six or eight years ago and was fitted to a number of stock cars as an auxiliary transmission, being incorporated with the friction clutch. A sectional view of this transmission is shown in Fig. 7.

The clutch cone carried an annular chamber filled with oil. The chamber was in halves, one-half being formed with curved impeller vanes on the inside, while the other half enclosed the driven member, which had similar vanes. The inclination of the vanes in the driving member was such as to cause the liquid to flow in the direction indicated by the arrows when the member was in motion, and

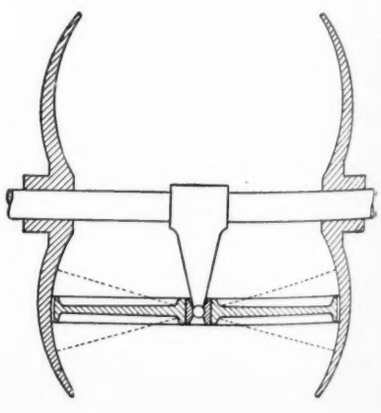


Fig. 5 — Double disk and swiveled wheel type of friction transmission

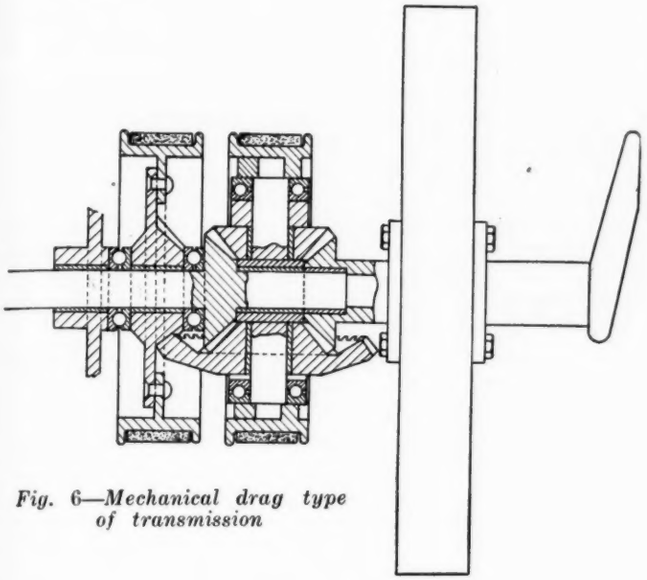


Fig. 6—Mechanical drag type of transmission

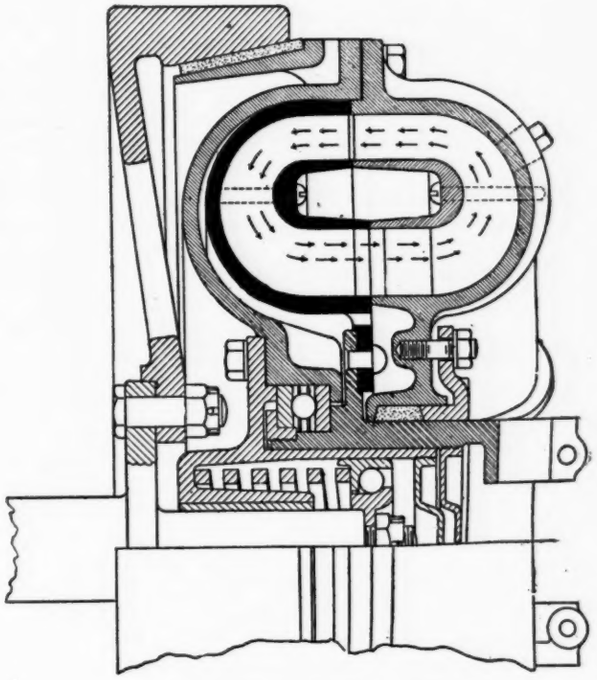


Fig. 7 (above) — Radcliffe hydraulic drag type of transmission

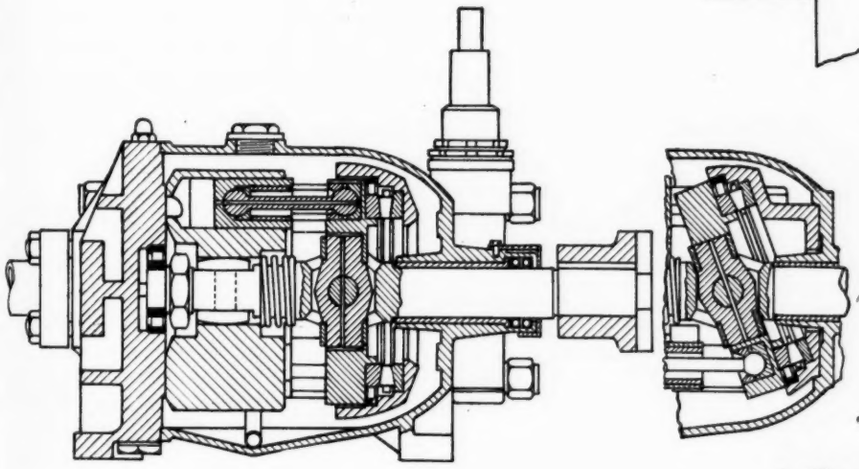
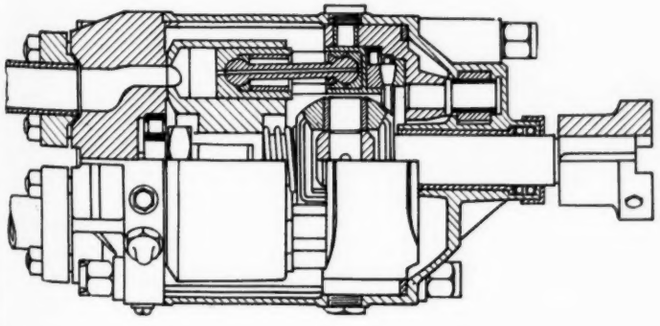


Fig. 8 (left) — Pump element of Waterbury hydraulic transmission. (Detail view shows the mounting of the angle box in the motor element, which is the only difference between this and the pump element)



the reaction between the flowing oil and the vanes of the driven member then set the latter in motion. Naturally, there was always some slippage, even when the resistance to motion was low. Radcliffe claimed that this device permitted of dispensing with the intermediary gear in the regular transmission but admitted that a low gear had to be used with it.

Leaving friction and belt drives out of consideration, the following five general types of transmission are available for obtaining a continuous variation of the transmission ratio:

1. The hydraulic type
2. The variable throw type
3. The Weiss type
4. The inertia type
5. Combined inertia and variable throw type

Continuous variation of ratio is not an inherent characteristic of hydraulic transmissions, and several devices of this type have been built in which only a limited number of ratios are obtained, such as the Lentz, which originated in Germany. A motor-bus type of this transmission was described in British engineerng papers about a year ago. The motor element comprises two chambers side by side, one twice the width of the other, in which there are roters that are keyed to the same shaft. Three different ratios are obtained by admitting oil to the smaller chamber, to the larger chamber and to both at the same time. An hydraulic transmission in which four changes of ratio are obtained was built in Philadelphia in 1923.

The simplest way to obtain continuous variability of the ratio consists in the use of a variable throw pump, and the most familiar type of such pumps is that in which the pump plungers are operated by means of a swash plate, that is, a revolving plate set at an angle to its shaft or axis of rotation. This device is used in the hydraulic drive made by the Waterbury Tool Co., Waterbury, Conn., which has been applied to various uses including railcar transmission. Two sectional views of the pump unit of this transmission are shown in Fig. 8. Practically the only difference between the pump and motor units is that in the former the inclination of the swash plate is adjustable or variable, while in the motor unit it is not. The

detail view in Fig. 8 shows the fixed mounting of the swash plate support in the motor unit.

Referring to the drawings, both the pump and the motor units have central shafts which project at one end only. To the inner end of each shaft is keyed a metal block in which are bored nine cylindrical holes parallel with the axis of rotation and spaced evenly around the axis of the block, these holes forming the working cylinders. When the cylinder block revolves the cylinder heads slide against valve plates. A port in each of the cylinder heads registers alternately with two annular ports in the valve plate, for the admission and delivery of oil, respectively. The admission port of the motor unit is connected to the delivery port of the pump unit, and the exhaust port of the motor unit to the inlet port of the pump unit, by a pipe, The two ports on the face of the valve plate are separated by a bridge.

Within each working cylinder there is a plunger, which connects through a connecting rod with spherical heads to a socket ring. The socket ring is connected to the shaft by means of universal joints, so that while it revolves with the shaft, its plane may be at any angle with the axis of the shaft, which angle is determined by the setting of the roller-bearing angle box on which the socket ring revolves.

The angle box of the motor unit is secured in the housing, as shown in the detail view Fig. 8, and the socket ring of this unit always makes an angle of 20 deg. with the shaft. As the shaft with the socket ring revolves the plungers will be reciprocated in their cylinders with a constant stroke. In the pump unit the angle box is supported on trunnions and by means of a control lever may be set to any desired angle up to 20 deg. in either direction while the gear is in operation.

If the angle box is set at right angles to the shaft there will be no reciprocation of the plungers in the cylinders when the cylinder block is revolving, and, consequently, no oil will be moved. When the angle box is set to make an angle with the shaft the plungers begin to reciprocate in the cylinders as they revolve around with the block. Each cylinder draws in oil through the port in the valve plate during one-half a revolution and delivers oil into the delivery port in the valve plate during the next half revolution.

The motor unit is merely an inversion of the principle of the pump unit, oil entering the cylinders under pressure forcing the plungers outward, and the reaction between the socket ring and the swash plate causing the cylinder block and its shaft to revolve. If the angle plate of the pump unit is set to the same angle as that of the motor unit, then the motor will turn at the same speed as the driving or pump unit, and any speed lower than this can be obtained on the motor shaft by merely reducing the angularity of the pump unit angle box.

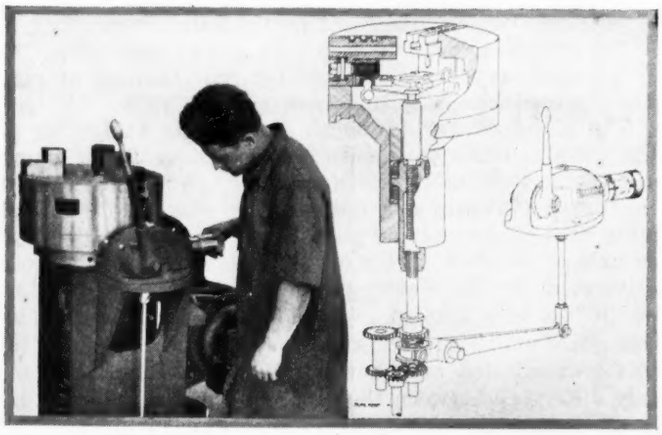
For a transmission built for a 150 hp. railcar powerplant the efficiency is said to range from 65 per cent at quarter load and full speed to 82 per cent at maximum load. A transmission of this type naturally has considerable weight, and this particular design is said to weigh 25 lb. per horsepower transmitted.

(To be continued)

Bullard Designs a New Power-Operated Chuck

MACHINING time on chucked work includes a considerable amount of time required to chuck the piece in either standard chucks or fixtures. While the function is necessary to production, it is not directly productive, and any saving which is made decreases idle time and increases productive time. On single spindle machine tools, chucking time is a definite factor in the process, no matter what portion of the productive time it comprises. In the multiple spindle machine, where loading is done simultaneously with machining, this factor only becomes important when the rate of machining crowds the operator beyond his capacity to chuck. The idle time due to chucking can be reduced by the use of power chucks.

A power operated chuck has been designed by the Bullard Machine Tool Co. and has been placed in use on various models of the company's tools. Referring to the cutaway view herewith, a screw and nut exert a vertical pull, and the resulting vertical motion is transferred to the three jaws of a standard chuck by bell crank levers. The mechanism may also be adapted to the operation of special fixtures designed with its use in mind. The construction is such that after the chuck is once set by power it cannot be released except by reversing the motion. Operation of the chuck is controlled by a double clutch with angular teeth and compound gears which provide power in either direction from a common source. The driven member of the clutch is brought in contact with either the forward or the reverse drive by connection with a hand lever operating through dart and spring tension so calibrated as to actually weigh the pressure on the jaws.



Bullard power chuck. Sectioned view shows mechanism

The Bullard power chuck has been successfully applied to four-spindle and six-spindle Contin-U-Matics for the operation of both standard chucks and special fixtures and is an essential feature of the new Vert-Au-Matic. It is also incorporated in Mult-Au-Matic design as a special feature, furnished only when specified for machines under construction. It has not as yet been developed for application to machines already in use. In operation it is simply necessary to throw the lever engaging the clutch for either forward or reverse movement. The clutch is automatically disengaged when the movement has been accomplished, and it is impossible to build up an excessive jaw pressure by holding the clutch lever in the engaged position. For convenience, the operating lever has been located on the carrier beside each spindle of the Contin-U-Matic model, and for the Mult-Au-Matic a common lever and clutch mechanism is located at the loading station, each chuck spindle engaging therewith as it is presented. The time required for operating the chuck in either direction is two seconds.

Just Among Ourselves

Will Rogers Solves Traffic Problem

WILL ROGERS is propounding a new and sure cure for traffic congestion to the Follies audiences this year. When he is elected Mayor of New York, he says, he will have a law passed forbidding anybody to operate a car on the streets until it has been paid for.

Automobiles Make the Mind Move

USE of automobiles will help to make men look ahead mentally as well as physically; it tends to cultivate "motion-mindedness" in the static-minded persons who haven't the ability to visualize change before it occurs. This is the opinion expressed recently by Prof. H. F. Moore, research professor of engineering materials at the University of Illinois. His ideas along this line are interesting: "If you saw a person take a slanting dive off of a wharf, would you dive to rescue at the same place where he disappeared under the water?

"If you would you are 'static-minded' and should buy a car and cultivate motion-mindedness, for motion-mindedness is a sign of progress which is cultivated by the widespread use of the automobile. The driver thinks not of the place where the car is at the present time, but where it will be a few seconds later; he thinks forward or he has a collision. If the auto can lead people to think of men, events, philosophies and religions in the same way there is hope that they will get into a habit of asking where this man or that institution is leading and will avoid a few dangerous collisions in the future. If in the future years the majority of people are progressive and motion-minded, it will be due in a great measure to the influence of automobiles."

Waiting Salesmen Cost Buyers Money

WONDER how many thousands of dollars are added to the cost of automotive parts and supplies each year by the necessity of having high-priced salesmen waste hours and hours every day parked in the lobby of vehicle manufacturing plants? Waits of three hours are not at all uncommon while we know of cases where a man has waited nearly two days to see a buyer with the momentary expectation that his turn would be next. And the worst of it is that the buyer usually isn't at fault. Most salesmen will tell you that the buyer works hard all day, that he is very pleasant once you get in to see him and that the real reason for the long waits is the physical inability of the buyer to see any more people. There are buyers who delight in the authority given them over their fellow men and who keep men waiting when no real need for so doing exists; this group naturally hasn't any very enviable reputation in their trade nor do their companies profit by their egotism.

What Can Be Done About It?

IT'S hard to say what can be done about it. It is obvious that when a $10,000 a year man waits three or four hours to see a buyer his time is included in the price charged to the car manufacturer for the part or material. The vehicle builder pays the bill in the end. The sincerity and intelligence of the man at the reception desk plays a large part in raising or lowering efficiency in this regard. A petty tyrant at the reception desk, not only can lose a lot of good will for the company but also he can mess up appointments and telephone contacts between the buyer and the salesman in such a way as to increase difficulties materially. The time lost in waiting rooms is of such large proportions as to be a really serious problem calling for some definite study on the part of manufacturers.

Hupp Refunds Dealers on Price Cut Losses

HUPMOBILE is the latest addition to our collection of companies which make a practice of refunding distributors and dealers when price cuts are made. O. C. Hutchinson, Hupp's sales manager, sends us a clipping from the Hupmobile distributor contract covering this point. The contract, which is identical with the distributor-dealer contract, reads: "The manufacturer reserves the right to change prices of his product upon notice in writing duly mailed to the distributor. It is agreed, however, that if the manufacturer reduces the price of his current models of automobiles, such reduction shall apply to the stock of new and unused current model automobiles the distributor may have on hand at the date of said reduction, shipped by the manufacturer during the preceding six months. Demonstrating cars are not included in this stock of new cars." That makes Studebaker, Packard, Nash and Hupmobile the companies of which we know which favor and practice refunding to dealers losses sustained through price reductions. We don't believe that completes the list and so the polls still are open.

N. G. S.

Tests Show Practicability of Lavaud Automatic Transmission

Reduces fuel and oil consumption, increases acceleration and average speed and gives better control in traffic and on hills. To be used on 10 hp. Voisin.

By W. F. Bradley

AFTER three years' experimenting, the automatic transmission or torque converter invented by the French engineer Sensaud de Lavaud is ready for production and will first come on the market on the present 10-hp. sleeve-valve Voisin.

While, for experimental purposes, numerous cars have been fitted with the Lavaud transmission, particular attention has been paid to its adaptation to the light Voisin chassis, and designs have been worked out for the Lavaud axle and transmission to be substituted for the Voisin gearbox, torque tube and rear axle without any changes in the engine, chassis, suspension or control.

Voisin has secured priority rights in France for this transmission, and tests having proved satisfactory, it is expected that he will market it shortly.

The writer was invited to take charge of the last series of practical tests with the Lavaud transmission, the results of which were to determine the date of marketing the device. Two identical Voisin chassis were used, each having a Knight type sleeve-valve engine of 62 x 110 mm. bore and stroke (piston displacement, 81 cubic inches), the one being fitted with the Voisin normal three-speed gearbox and a spiral bevel final drive, giving a ratio of 5.38 to 1, and the other having the Lavaud transmission set to give an equivalent gear ratio. In other mechanical features the cars were identical.

The Voisin had a four-passenger fabric leather phæton body and the Lavaud chassis had a rough two-seated test body with a big tool locker on the rear. Repeated tests showed that by reason of better streamlining the completed body had a slight advantage in maximum speed. Unsprung weight of the Voisin rear axle was 283 pounds, and of the Lavaud transmission 352 pounds. Total weight was 2491 pounds for the Lavaud car and 2651 pounds for the Voisin, without passengers in both cases.

A total of 2164 miles was covered under the direct supervision of the writer, who drove either one or the other of the cars for the entire distance. Proved advantages of the Lavaud car over the Voisin were as follows:

1. Gasoline consumption decreased 15 to 26 per cent according to road conditions.
2. Oil consumption decreased 50 per cent.
3. A higher average speed, this advantage increasing with road and traffic difficulties, being greatest in the mountains and on city streets, and lowest on the plains.
4. More rapid acceleration.
5. Simplified control, making it possible for a novice to get results only obtainable by an expert with a gear shift car.
6. A wider range of speed, varying from 3 to 50 m.p.h. with throttle control only.

Disadvantages of the Lavaud transmission car were a loss of about 5 per cent in maximum speed. This may have been due, however, in a certain measure, to the increased head resistance of the makeshift body. On an average level road the engine speed on the Lavaud car was generally 200 to 400 r.p.m. higher than on the Voisin. There was a period of vibration in the swash plate which set up resonance in the axle tubes. On another type of axle housing this resonance was entirely absent, the rear axle being much quieter than the standard Voisin with spiral bevel gears.

Gas consumption tests were carried out over the entire distance of 2164 miles, the Voisin car consuming 94.83 gal. of gasoline and the Lavaud car 84.49, giving an economy for the latter of 10.9 per cent.

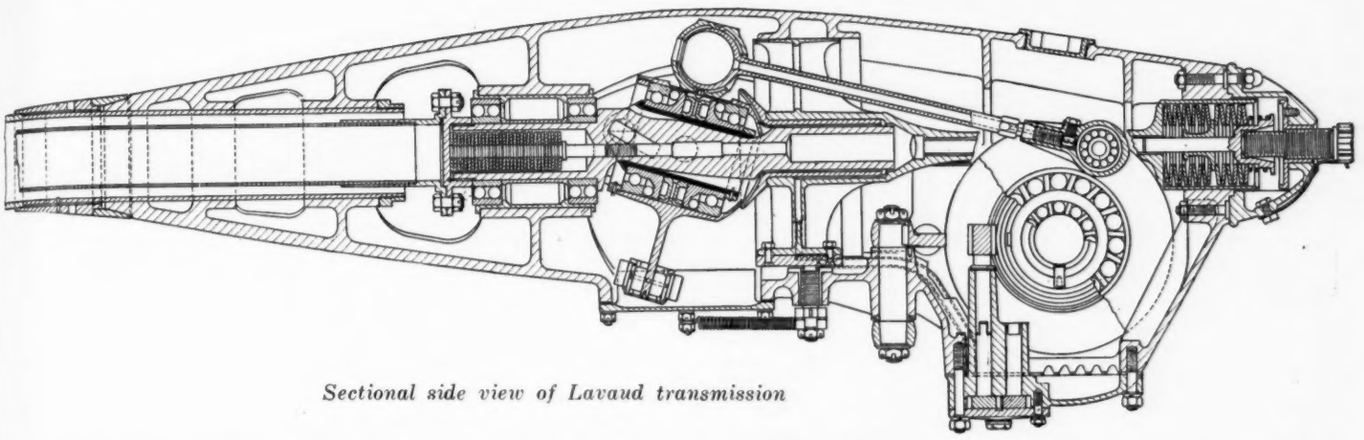
With identical carbureter settings the economy varied from 2.15 per cent to 35 per cent. The greatest advantage was secured over hilly or undulating roads, which called for the use of gears on the normal car. Under such conditions the Lavaud always had the correct ratio for the hill to be climbed, and all the descents were made coasting, with the engine running at the minimum number of revolutions.

One of the most interesting of the fuel tests was carried out in Paris during the peak hours of traffic. Each car was given a measured allowance of 4 litres (1.056 U. S. gal.), and engine timing, carbureter setting and magneto

MR. BRADLEY, the writer of this article, was given an unusual opportunity to observe the performance of the Lavaud automatic transmission under widely varying conditions as he was chosen to conduct the last series of practical tests in the streets of Paris and on the provincial roads of France.

He has related his experiences in an interesting manner, forgetting none of the details that is likely to be wanted by those in America who have been watching the Lavaud development since it first came into prominence about a year and a half ago.

Mr. Bradley is widely known as an authority on automotive topics and for many years has been European correspondent of Automotive Industries.



Sectional side view of Lavaud transmission

were identical on the two machines. The two cars were driven over as varied a route as possible.

The Voisin stopped with its gas tank empty after covering 15.97 miles, during which time 181 gear shifts were made.

The Lavaud car continued, and came to a stop after 21.59 miles had been covered, being 5.62 miles more than the gearbox car, or an increased mileage of 35.2 per cent. The Lavaud transmission gave an immense advantage in ease of control and in maximum speed, and on frequent occasions had to wait for the Voisin car to catch up with it.

Ease of control was revealed in the Alps. The most difficult climbs were made across the Grande Chartreuse, comprising the Col de Cucheron at 3870 feet, and the Col de Porte at 4429 feet.

The ease of handling was exemplified in starting away on steep gradients. With the coaster axle it was possible for the car to run backward and to start away; all that was necessary was to throw in the clutch and step on the accelerator.

As this invention embodies a coaster axle, no use can be made of the engine for retarding the car. This slightly modifies the method of driving, for the best results are obtained by either keeping the accelerator pedal down or releasing it entirely. With the acquired habits of a normal car it frequently was found that on slight gradients the engine was doing nothing more than mark time with the car. In other words, a decrease in engine speed from 1200 to 300 r.p.m. resulted in no decrease in car speed.

The coaster axle gave perfectly free running. A speed test was made down seven miles of winding mountain road, when the Voisin was driven at the highest possible speed consistent with the safety of the occupants of the car, the engine being used all the time and the gears being brought into play on a few occasions to secure a more rapid getaway. The Lavaud with its coaster device held its position and could have passed the Voisin if a sufficient stretch had been encountered. On a suitable down stretch the Lavaud attained 60.2 m.p.h. over the measured kilometer; the highest speed attained by the Voisin on the level was the kilometer in 42.8 sec., equivalent to 52.2 m.p.h.

On a slow running test the Lavaud covered 100 meters in 65 seconds, which is equivalent to 3.44 m.p.h., and immediately afterward was accelerated to its maximum speed. In city driving the difficulty was to realize that the clutch could be left alone until the car had practically come to a standstill.

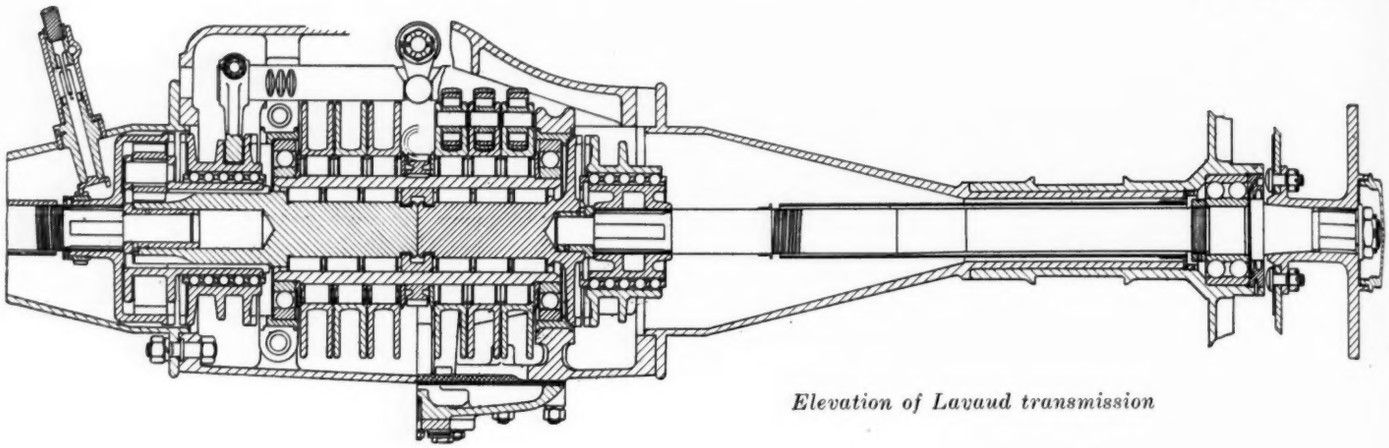
Sensaud de Lavaud Well Known in America

SENSAUD DE LAVAUD, the inventor of the Lavaud automatic transmission, or torque converter, is well known in America, especially in metallurgical circles.

He once spent about six years in this country, mostly in New York City, his mission being the introduction of the method which is now used throughout the world in the centrifugal casting of iron pipe. He is known as the originator of the process. After securing patents here he organized the Centrifugal Cast Iron Pipe Co. Later the company was reorganized and is known now as the Centrifugal Pipe Co. It still controls the patents, although the manufacturing rights for America are held by the U. S. Cast Iron Pipe & Foundry Co.

According to a prominent New York attorney who had extensive business dealings with him while he was in the United States, Lavaud has had a picturesque past. He was born in Lavaud, France, educated in Turkey, and located in Sao Paulo, Brazil, in his early twenties. In Sao Paulo he set up a small machine shop along the water front for the repair of ship machinery. It was from this humble environment that he came to the United States with his centrifugal pipe casting process.

On leaving this country, about seven years ago, he returned to the land of his birth and has since made his home in Paris. The automatic transmission marks his first appearance in the field of automotive engineering. He is not, by the way, a technically trained engineer.



Elevation of Lavaud transmission

Oil economy throughout the entire series of tests averaged not less than 50 per cent. The explanation of this doubtless is that with the Lavaud transmission there never was any occasion to push the engine up to very high speed, and there were frequent periods when it was idling at 300 r.p.m. while the Voisin was turning over at 1500 to 2000 r.p.m. with very little load.

The swash plate on the car under test had an inclination varying from 4 to 16 deg., which gave a range of speed from 3 to 55 m.p.h.. In driving this car, the clutch was used in the ordinary way for starting, but owing to the low speed at which the car could be throttled down, there was no necessity to touch the clutch again unless a complete stop was to be made.

On the latest model, about to go on the road, the inclination of the swash plate is from 0 to 16 deg., thus allowing the clutch to be abolished. On the present model the inclination of the swash plate can be varied, within a certain measure, by varying the degree of compression of the dished washers, but on the new type this control will be brought up to the driving wheel, and will enable the operator to vary the ratio at will. A differential is used in the axle and a lever provides neutral and reverse.

While there are more parts in this transmission than in a gear set and bevel rear axle, Lavaud maintains that the cost of production on a big scale will be no greater than for a normal type of car, for most of the parts are repetition pieces. It appears to be the intention of Voisin to put a small series on the market this year and to go into big production next year.

THERE are at least 256 named routes and 97 different associations each promoting one or more named highways in the United States, according to information furnished by the committee of Federal and State highway officials, appointed recently by the Secretary of Agriculture to develop a uniform method of numbering and marking highways.

Overlapping of routes is common, in fact there are few of them that are not coincident with some other route at some portion of their length. One well known route 1500 miles long overlaps other routes for 70 per cent of its length. Ten different routes are involved in this overlapping and in places two or three of them coincide for several miles.

The work of the committee will be to decide on the best system of designating our highways and recommend a remedy for the present confusion in designation and lack of designation. Every section of the country is represented on the committee and the plan decided upon should be suitable for both State and National needs.

Spring Demand Holding Up Longer Than in Former Years

(*Continued from page* 1048)

2. As an accounting problem—the dealer should segregate his used car from his new car business, so as to know whether he is losing on used car operations. Part of his overhead should be charged to used cars, but he seldom realizes this.

3. As a merchandising problem—a separate technique for the handling of used cars is needed if the business is done on a barter instead of a cash basis, as an auxiliary to new cars, it is bound to suffer.

4. As a public problem—the consumer has to be educated to the thought that used cars are a stable commodity with a stable price trend; that reputable dealers, whose methods and merchandise can be depended upon, are not selling used cars for a song or allowing more than a fair price on trade-ins.

This last is the knottiest of all to solve. It can best be done, probably, by local dealers' associations, through newspaper statements. What would help most would be periodic quotations of the used car market, with publication of the latest average of prices for various models of the popular makes. If the consumer could see these market reports he would not be so inclined to haggle over the price set by the dealer.

Market prices are published in other important commodities—why not in used cars?

All of which fits into the picture of the automotive industry of the immediate future, an industry that should be sound and stable in all its departments, with adequate profits for all who are willing to use discretion and judgment. That picture is already being sketched in along the following lines:

1. A yearly market that is more or less uniform, and that can be more or less accurately predicted in advance, based on replacements, an annual increment of new buyers that should vary little, once the field ceases to respond to artificial stimulants, such as uneconomically liberal time sales terms.
2. Orderly development of foreign markets.
3. Prices based on material costs and overhead.
4. A stable used car market.
5. Production geared to sales.
6. Lowered seasonal fluctuations.

Unless all the signs are misleading, the future historian of the automobile industry should find that greater progress toward these ideals was made in 1925 than in any preceding year.

Here and There in Foreign Markets

By special arrangement with the Automotive Division, Bureau of Foreign and Domestic Commerce

New Paraguayan Tariff

UNDER the new Paraguayan tariff, which is scheduled to become effective on Sept. 1, 1925, most duties are specific, instead of ad valorem on official valuations, as formerly, although in certain cases alternative minimum ad valorem duties are established. Some goods are subject to a compound duty, i.e., a specific plus an ad valorem duty. The free list has been extended to include a great many articles necessary for the development of national industry, agriculture, health, education, and religion. The old system of official valuations and the 1½ per cent surtax will no longer be in force. The new duties on automotive items are as follows: Automobiles, tires, etc.: (Item 710)—Passenger automobiles, 7.50 pesos per 100 net kilos. (Note: The duty on automobiles in no case can be less than 20 per cent ad valorem); (715)—Single tube tires and inner tubes for pneumatic tires, 0.80 pesos per legal kilo; (730)—Pneumatic tires or casings, whether plain or nonskid, for automobiles, 0.50 peso per legal kilo.

Prospects Good in Spain

A SLIGHT seasonal recession has occurred in Spain's automotive trade, but the exposition at Barcelona has attracted great attention and important sales are anticipated. The demand for light trucks continues. Sales of moderate priced and luxury type American cars are normal for the season. The higher value of the peseta in terms of the dollar has favored Spanish imports from the United States, especially as peseta appreciation in terms of the pound sterling has been considerably less important.

Demand Good at Prague Show

AT the seventeenth annual Prague Automobile Show, held during the week of April 12-19, all dealers handling American cars reported good sales and many inquiries. The Czechoslovak automobile manufacturers are reported to have sold their entire production up to July, and this accounts for the unusual number of inquiries for cars of foreign makes, of which full advantage is being taken by American automobile representatives.

Freight Cost Must Be Shown

THE amount of freight paid on merchandise shipped to Peru must appear on all copies of a bill of lading, otherwise they will not be accepted by Government officials. This regulation is for the purpose of expediting the collection of the stamp tax on bills of lading, which is based on the amount of the freight charges.

Rio Show in August

THE first automobile show in Rio de Janeiro will be held between Aug. 1 and 15 under the auspices of the Automobile Club of Brazil. The exposition is to be held in the Portuguese pavilion in the Exposition Grounds and will be inaugurated with a flower battle on the Avenida das Nacoes for the purpose of stirring up interest on the part of the populace. It is assumed that all dealers now operating in Rio will show cars, and other exhibits are expected. The committee in charge of the show consists of the Minister of Transportation, Dr. Francisco Sa, and Dr. Candido Mendes, head of the Brazilian Roads Commission.

No Duty on German Exhibits

AMERICAN automobile manufacturers desiring to exhibit at large German fairs like Leipzig, Frankfort or Cologne, will be interested in the announcement of the Automotive Division, Department of Commerce, that samples may be imported for display at these fairs without the necessity of paying duty or securing an import license, by registering the samples at the customs house in the exhibition city. If these samples are then sold for retention within Germany, it is only necessary to pay the import duty, if the samples are of such goods as do not ordinarily require an import license.

Endurance Test in Uruguay

THE First International Automobile Endurance Test was held in Uruguay, April 5 to 8. Fifteen American automobiles and one Italian automobile entered the contest. Most of the American automobiles made excellent records, only two failing to cover the 550 miles of country roads in the prescribed time. The Italian car also failed to arrive. This test was regarded as very successful, and it is expected that one of its results will be an impetus to the road building campaign in Uruguay, with a consequent increase in the sales of American automobiles.

Denmark Plans Motor Celebration

A LARGE international exposition is to be held in Copenhagen during the first part of 1926 to celebrate the twenty-fifth anniversary of the automobile in Denmark. It is planned to erect new buildings for this exposition, there being no quarters at the present time to accommodate such an undertaking, and invitations will be sent to foreign countries to attend and participate in the exposition.

Lower Duties in Guatemala

THE import duty on motor trucks of one and two tons' capacity has been reduced from 10 centavos to 5 centavos per gross kilo by a Guatemalan decree of April 3 published in *El Guatemalteco* of April 24, 1925. The duty on motor trucks is payable one-half in American currency and one-half in Guatemalan currency.

Physicists Helping to Solve Problems of Tire Manufacturers

Chemical puzzles presented by rubber now cleared up to certain extent, except that as yet chemistry of the material fails to account for its physical properties.

CRUDE rubber as received by the tire manufacturer is a rather indefinite material, varying with the soil, climate, age of tree, method of coagulation and method of transport. Physicists began to study the properties of rubber before its chemical composition was determined.

The chemical problem presented by rubber is now cleared up to a certain extent, except for the fact that as yet the chemistry of the material fails to account for its physical properties. Rubber manufacturers, therefore, have added physicists to their research staff, and they find many problems to attack and much matter for cooperative effort and for discussion.

In a lecture on "Physics in the Rubber Industry, with Special Reference to Tire Manufacture," delivered recently before the Institute of Physics in London by Dr. Walter Makower of the Dunlop Rubber Co., the various problems that arise in the manufacture of automobile tires were outlined and the methods of attack adopted in the Dunlop works stated.

Much has been done to secure greater uniformity in crude rubber; but progress in that direction is slow. The variability of the raw material would not much matter, Dr. Makower remarked, if the manufacturer could only rely on suitable tests. Until recently, however, rubber had largely been graded by color. For smooth working in the factory, hardness was one of the most important qualities. When the rubber was too hard, great difficulties were experienced in extruding in the preparation of the tire treads, solid tires or inner tubes, and in topping or frictioning rubber on the cotton fabrics forming the walls of pneumatic tires. Damage done to the fabric in these operations was fatal. When the rubber was too soft, on the other hand, the final product suffered.

Biting Test for Hardness

Hardness formerly was estimated by the touch or by a biting test. What was wanted was measurement of the viscosity, and that was done in the Dunlop works by forcing the rubber at 80 deg. C., when it was relatively soft, through the orifice of a "plastometer." A cylinder containing the material was immersed in a water bath, maintenance of constant temperature being essential.

When the viscosity (reciprocal of plasticity) was plotted against the time the rubber had been milled or masticated, one rubber might give three times the value of another. As the temperature of mastication was lowered from 100 deg. to 75 deg. C., the weight of rubber masticated per minute went up from 2.0 to 5.65 lb.; during the mastication the rubber should therefore be kept as cool as possible on the rolls.

After mastication the rubber gradually regained some of its hardness by "maturing"—a term indicative of our ignorance of what took place. The plastometer showed that a rubber would become by maturing as hard in 30 hr. at 134 deg. Fahr. as it became in 300 hr. at 60 deg. Fahr. Rubber should evidently be stored cool to remain soft. The subsequent extruding and calendering again demanded constant temperature. The temperature was formerly judged by touch or by mercury contact thermometers; thermocouples had only been introduced into rubber works by the physicists.

The incorporation in the rubber, after milling, of the sulphur and compounding drugs was controlled by mechanical tests. Dr. Makower's stress-strain curves, in which elongation was plotted against load, showed how the rapid rise, almost to a maximum, of the elongation of a pure rubber for an inner tube was retarded and decreased by the compounding agents.

Much Depended Upon Drug

The hardness, resistance to abrasion, hysteresis losses and resistance to fatigue of the final product depended as much upon the physical state, size of particles, etc., of the drug as upon its composition. Thus, two materials as similar as lamp black and gas black behaved very differently in solid tires; but our knowledge of these matters was largely empirical. Vulcanization (also called "curing"), *i.e.*, the reaction between the sulphur and the rubber, set in about 115 deg. C., and accelerated rapidly with rising temperature.

Articles to be cured were placed in pans heated by high-pressure steam. With bulky goods like tires there was great danger of overcuring the outside before the heat reached the inside. Very slow heating would take much time, and in this instance time was literally money. The amounts of sulphur and accelerators added were therefore adjusted to the requirements, and for that purpose the rate of the temperature penetration into the tire and the temperature distribution had first to be determined. Within the last two years this had been accomplished with the aid of thermocouples by D. F. Cranor in America and by A. A. Perks and R. W. Griffiths of the Dunlop Company, whose researches, on four-ply and eight-ply covers promised to revolutionize vulcanization.

Passing to the design and balance of a tire, Dr. Makower pointed out that the tire consisted of a cotton casing, the plies of which were held together with rubber, surrounded by the outside rubber tread and side-walls, and the intermediate mixes which serve to attach the hard outside to the case and to protect it; there were additional structures, such as beads for holding the tire on the rim.

In service, the cotton, which was now generally applied in the form of cords, was apt to fail by fatigue under the repeated bending of the case-walls. All the parts should be made so as to fail simultaneously owing to abrasion, loss of internal adhesion, etc., but it was customary to let the tread wear away before other elements failed—a psy-

chological rather than a physical consideration; people seemed to be ready to admit that the tread might wear through.

Balance of the parts could be secured by physical tests; but the methods applied had too closely followed the analogy of metal testing. The properties of the cords had to be adjusted to their position in the ply, which was stretched on the outside and compressed on the inside. The cotton was tested at the Dunlop works in machines in which the threads were bent by passing over rollers, and had to raise and lower weights in harmonious motion; owing to the variability of the cotton, hundreds of threads had to be submitted to this fatigue test.

There was no standard test for the fatigue value of the insulating rubbers, which were placed between the plies to prevent their rubbing on each other. One might build up membranes of alternate layers of cord and of the insulation, stretch the membranes over drums charged with compressed air and then tap them with a rounded tool; but a visual method would be required to indicate incipient breakdown.

Factors Affecting Wear

The wear of the rubber depended greatly upon the conditions of service and road, the skill of the driver, the weight and steadiness of the car, etc., and the many laboratory methods of testing in use would put the tires into almost any order of merit. Dr. Makower considered that the adjustment of the slip between the rubber and the abrading surface was the characteristic feature representing road wear; plotting rate of abrasion against slip, he found that with small slip there was very little abrasion, but that with increasing slip the abrasion grew rapidly.

As regards hysteresis, it should be borne in mind that the very object of providing a tire, for shock absorption, implied the existence of damping forces. It was futile to design car and tire separately; careful adjustment between springs and tires was needed, and the whole question of the function of tire equipment had been proved to admit of mathematical treatment in a paper which A. Healey had brought before the Institution of Automobile Engineers last winter.

Hysteresis tests of the rubber and the cotton composing the tire walls had often been made at slow speeds, while the actual deformations in the tire might take place at the rate of 50-cycles per second. To satisfy road service conditions the specimen should be subjected to the impact of a heavy pendulum of adjustable mass and impact duration. The observations might be checked by inserting thermocouples into the tire rotating on a machine; the difficulty of bringing out the leads of the rotating couples might be overcome with the aid of slip rings.

Solving the Storing Problem

Many problems, such as the storing of goods to obviate their deterioration with age, could only be solved by cooperative effort. For preservation in hot climates some compounded materials were mixed with a small percentage of paraffin wax which, exuding out, formed a protective film. The deterioration seemed largely to be an oxidation effect, and accelerated ageing tests were now made in oxygen and ultra-violet light at 70 deg. C.; the dangerous region of the spectrum was not yet well determined.

Trouble in so complicated a production as a tire might arise from many causes, and a failure could not always be tracked down by inquiries in the various departments of the works, or finally be disposed of temporarily by calling upon the physicist to devise some test. While urging harmonious cooperation of management and research staff and the appointment of a scientific man of high attainment on the board of influential corporations, Dr. Makower quite admitted that some managers had good reasons not to be impressed by the records of measurements made apparently for the sake of measuring.

Automobile Growth in France

A SURVEY of conditions in the different industries in France is being printed in *La Technique Moderne*. Concerning the automobile industry this publication says that in the absence of accurate statistics of industrial production it is impossible to give actual figures for the output of this branch of French industry. It may, however, be stated, in the first place, that the number of vehicles on which taxes were paid has increased regularly since the Armistice, passing from approximately 230,000 in 1921, to 500,000 in 1924.

The increase in the number of vehicles in service figures out to about 60,000 in 1921, 80,000 in 1922, and 100,000 in 1923. These figures, however, constitute only a lower limit for the total annual production of automobiles in France, as they do not take account of the new vehicles required to replace those wrecked or junked. And, moreover, the exports of French chassis greatly exceeds the imports of vehicles into the country. The excess of exports over imports amounted to 14,500 chassis in 1922, 22,500 in 1923 and 33,800 in 1924.

But whatever the importance of the exports of French automobiles and the favorable effect they have in the commercial balance, the home market still occupies the first place among the outlets of the automobile industry. And it is precisely the latter in which there has been a slowing down during the past few months, whereas the exports increased. The decrease in the home demand alone is responsible for the slackening of activities at the automobile factories, which at the present time give employment to about 400,000 operatives.

The causes for this recession are probably to be found in the increases in price which were not followed by a parallel development of the means of private individuals, which led to a certain saturation of the market; in the constantly increasing expenses with which the budget of the motorist is taxed and in the recent threats of increased taxation. Senator De Dion, president of the Industrial Automobile Federation, is of the opinion that in order to maintain a considerable home market, counting only on the export field for further growth, it is essential that registration fees or annual taxes on automobiles be kept within reasonable limits and that the tax on gasoline be reduced to a minimum.

A NEW bearing metal known as Mahanite has been placed on the market by J. E. Loudon & Co., Boston 10, Mass. It was developed experimentally and is claimed to give longer wear than the bearing metals commonly used. The material is an alloy of several components which are mixed in a certain order. The method of mixing is responsible to a large extent for the special properties of the material.

The material has been used in the form of bushings for buffing machine spindles, punch presses, exhaust fans, grinding machine spindles, centrifugal hydro-extractors, street car motor shafts, etc.

Mahanite is sold in the form of solid bars, solid bushings and Mahanite-lined bushings. The solid bars are 24 in. in length by ½ to 1¼ in. in diameter. Solid Mahanite bushings and Mahanite-lined bushings are furnished in all sizes, finished or unfinished.

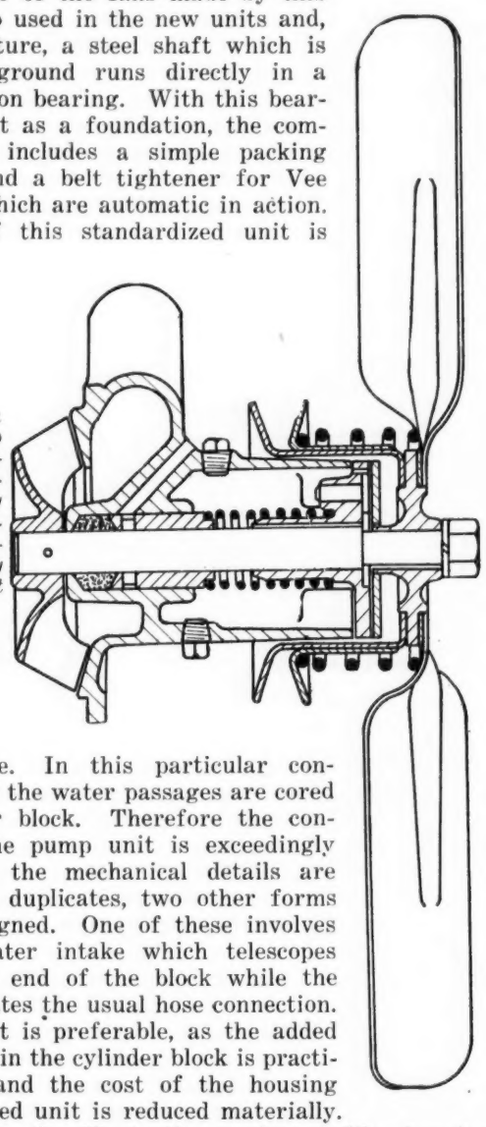
New Combination Fan and Water Pump Unit Is Developed

Unusual simplicity characterizes product. Internal gear pump lubrication and automatic belt tightener are among features.

UNUSUAL simplicity characterizes the standardized fan and water pump units which have been developed by the Automotive Fan & Bearing Co. of Jackson, Mich.

Internal gear pump lubrication, which is the distinguishing feature of the fans made by this company, is also used in the new units and, due to this feature, a steel shaft which is hardened and ground runs directly in a broached cast iron bearing. With this bearing arrangement as a foundation, the complete assembly includes a simple packing gland design and a belt tightener for Vee belts, both of which are automatic in action.

One form of this standardized unit is illustrated here. In this particular construction, all of the water passages are cored in the cylinder block. Therefore the construction of the pump unit is exceedingly simple. While the mechanical details are similar, if not duplicates, two other forms have been designed. One of these involves an annular water intake which telescopes into the front end of the block while the other incorporates the usual hose connection. The first layout is preferable, as the added coring expense in the cylinder block is practically nothing and the cost of the housing for the combined unit is reduced materially.



Standardized fan and water pump unit which incorporates a pressure lubricating pump and automatic belt tightener and packing gland adjustment

As shown by the illustration, a barrel like housing forms the bracket for the pump and fan unit and serves as the oil reservoir. This housing is piloted and bolted to the front end of the cylinder block. At the front end a flanged cast iron sleeve which, with its stamped steel cover, is bolted on, forms the fan or pulley bearing. Two counterbores are machined in the cast iron sleeve. One of these is concentric with the shaft and the other is offset as shown. A gear of ⅛ in. width which is fastened to the shaft just back of the fan hub runs in the first counterbore, while a composition gear mounted on a steel stem runs in the second counterbore and meshes with the gear on the main shaft. A small hole, which is drilled in the flanged sleeve near the bottom, forms the oil intake for the gear pump arrangement.

While the front of the pump is closed by a simple steel stamping, leakage around the shaft is prevented by a spiral which is machined around the center hole. With the proper direction of spiral, the gear, which is fitted rather closely, sets up a wiping action that carries the oil to the periphery of the pump housing. This bearing is broached and has a single longitudinal groove running from the oil pump outlet to the back end of the bearing. Drive to the main shaft is by a pressed steel pulley which is riveted to the fan hub. One side of this pulley is free to slide on the pulley proper and is spring actuated longitudinally. With a spring of moderate pressure, a definite belt tightening action is set up by causing the belt to ride higher on the pulley faces as elongation occurs.

Another spring inside of the housing produces the necessary endwise pressure on the packing gland which is placed adjacent to the water pump impeller. This spring is piloted at one end around the pulley bearing and at the other end on a bronze bushing which centers the shaft and serves as one side of the gland housing. This part is lubricated by oil which is carried along the shaft by capillary attraction and the leakage of water back into the oil chamber is prevented by vents, as shown. Fabric packing is used and a pressure of less than 20 lb. at the spring has been found to produce the necessary compression on the packing. As shown, the impeller is secured by a threaded nut, although a pin is used for this purpose in some cases.

A filler plug is located on the housing in a position which determines the maximum oil level. One filling suffices for upward of 20,000 miles of car service and thorough lubrication is insured if as little as two tablespoonfuls of oil is in the oil compartment. In the illustration shown, two stampings are crossed to form a four blade fan of 16 in. diameter. These blades, with the fan pulley hub, are riveted to the steel fan hub.

NORMAL aging has but little effect on the strength of leather, according to tests recently completed in the leather laboratory of the Bureau of Standards. Twenty samples of belting leather showed an average original tensile strength of 5045 pounds per square inch. Adjacent samples, recently tested after ten years' aging, showed an average tensile strength of 4515 pounds per square inch, a decrease in strength during the ten-year period of approximately 15 per cent.

It is of value to note that no special storage conditions were created, the leather remaining in the laboratory under normal atmospheric conditions and at room temperature. As indicated by these tests, leather may be satisfactorily stored under ordinary conditions of humidity, temperature, ventilation and light. Extreme dampness and exposure to direct sunlight should be avoided.

25 New Proposals Laid Before S.A.E. Standards Committee

Will be asked to approve aeronautical safety code, aircraft practices, motorcoach headlight mounting and nomenclature, tractor rating code, poppet valve changes, etc.

AMONG 25 proposals which will be submitted for the approval of the Standards Committee of the S.A.E. at the Summer Meeting in White Sulphur Springs, W. Va., this week is the Aeronautical Safety Code, which has been worked out by a sectional committee of the American Engineering Standards Committee, and for which work the Society in 1920 assumed the sponsorship jointly with the Bureau of Standards. The sectional committee worked through sub-committees, each part being handled by a sub-committee. The parts dealt with were as follows:

Introductory Part—Scope and Nomenclature
Part 1—Airplane structure, Design, Fabrication and Tests
Part 2—Powerplants, Design, Assembly and Tests
Part 3—Equipment, Maintenance and Operation of Airplanes
Part 4—Signals and Signaling Equipment
Part 5—Airdromes and Airways
Part 6—Traffic and Pilotage Rules
Part 7—Qualifications for Airmen
Part 8—Balloons
Part 9—Airships
Part 10—Parachutes

As each part was approved by a sub-committee, it was printed in pamphlet form and over 900 copies were distributed among those interested, to draw out criticism of the various requirements specified. The reports of the sub-committees were received and approved by the sectional committee at a meeting held on April 23 last, and are now to be submitted to the sponsor bodies for their approval.

THE standardization work of the S.A.E. has been an important part of the society's program for many years.

This year sees 25 new recommendations covering codes, parts, practices and materials placed before the Standards Committee for approval.

The recommendations approved will, in accordance with the Standards Committee regulations, be submitted for a letter ballot of the voting members of the society before becoming official S.A.E. standards and recommended practices.

A digest of the new recommendations is given here.

Aircraft Standards

Owing to the fact that the Government is practically the only purchaser of aircraft, the Aeronautic Division has decided as a definite policy to propose as S.A.E. Recommended Practice such standards as are adopted at the Joint Army-Navy Air Service Conference. The object of this conference, which met for the first time at Philadelphia on June 20 of last year, is to eliminate the differences in the specifications and requirements for the standard parts of the Army Air Service and the Navy, and to adopt a uniform system of standards.

The S.A.E. Aeronautic Division has reviewed to date the Army-Navy Standards on turnbuckles, hose-liners, washers, cotter-pins, shackles, thimbles, terminals and pulleys. The standards for turnbuckles and thimbles are substantially the same as the corresponding present S.A.E. Recommended Practices, and the idea is that the proposed standards shall replace the present S.A.E. Recommended Practices.

Tractor Rating Code

A tractor testing code has been worked out by the Agricultural Power Equipment Division. Prof. O. W. Sjogren of the University of Nebraska, chairman of the Division, is also chairman of a committee appointed by the American Society of Agricultural Engineers, and the same report has been submitted to that organization.

With the report are submitted two testing forms, or log sheets, one for belt horse power tests and the other for drawbar tests. The Tractor Rating Code is as follows:

Belt Rating.—The belt-horsepower rating of the tractor shall not exceed 90 per cent of the maximum load which the engine will *maintain by belt at the brake or dynamometer* for 2 hr. at rated engine speed, the test to be carried out as specified herein.

Drawbar Rating. — The drawbar rating of the tractor shall not exceed 80 per cent of the maximum drawbar horsepower developed at a rate of travel recommended for the ordinary operations for the tractor under conditions of testing as specified herein.

Nature of Tests.—The following rating tests are to be conducted in the order given on three or more tractors picked at random from factory stock by the engineer or engineers conducting the test. The averages of all tests are to be used in determining the results.

Limbering-Up Run.—Before a test is undertaken it is important that the tractor shall have been in operation for a sufficient length of time to attain proper operating-conditions throughout so that the results of the test shall express the true working performance. The tractor or tractors to be tested shall therefore be submitted to "limbering-up" runs on the drawbar of 12-hr. or more duration. Drawbar loads of approximately one-third, two-thirds and full load shall be pulled by the tractor during the runs, each load being drawn for approximately an equal length of time the lighter loads being used first.

Maximum Brake-Horsepower Test.—The tractor engine is to be tested in the belt with the governor set to give full opening of governor valve, and the carbureter set to give maximum power at rated engine crankshaft speed. (The rated speed is that which the manufacturer recommends for the engine under normal load.) The test shall begin after the temperature of the cooling fluid and other operating conditions have become practically constant. The duration of this test shall be 2 hr. of continuous running with no change in engine adjustments. If the speed should change sufficiently during the test to indicate that the operating conditions had not become constant when the test was started, the test will be repeated with the necessary change in load as measured in pounds on dynamometer or brake scale. Minor changes in load are to be made to maintain the rated speed and the average load and average speed for the period shall be used in computing the horsepower. All belt-horsepower tests must be made with an electric dynamometer, or with an accurately tested prony-brake or other accurate power-measuring device. Correction shall be made for temperature and altitude effect on horsepower output. Standard conditions of barometric pressure of 28.6 in. of mercury and a temperature of 70 deg. Fahr. or 530 deg. absolute temperature shall be used.

Correction Formula Proposed

The following correction formula shall be used:

$$Hp_c = Hp_o \times (P_s/P_o) \times \sqrt{(T_o/T_s)}$$

where

Hp_c = corrected brake-horsepower
Hp_o = observed brake-horsepower
P_o = observed barometric pressure in inches of mercury
P_s = standard barometric pressure in inches of mercury
T_o = observed absolute temperature in degrees fahrenheit
T_s = standard absolute temperature in degrees fahrenheit

Maximum Drawbar-Horsepower Test.—After the tractor has attained proper working conditions it shall be subjected to a series of drawbar tests, preferably on level ground, and of such a nature that it will provide a firm footing and offer tractive resistance simulating that of grain stubble ground in good plowing condition. The loads shall be successively increased or decreased to a point where the tractor can sustain a constant pull for a distance of not less than 1000 ft. with the average engine-speed maintained within 5 per cent of its rated full-load speed and a wheel slippage of not more than 10 *per cent.* The wheel slippage to be obtained as follows: The tractor shall be driven without any drawbar load for a distance sufficient to give 10 *revolutions* of the drive wheels. This distance shall be accurately measured and used as the basis for computing wheel slippage. The number of revolutions of all drivers shall be counted for the entire distance through which the load is pulled. The drawbar pull shall be measured by an accurately calibrated draft-dynamometer or draft measuring-device placed between the tractor and the load. The actual distance traveled shall be used in calculating the horsepower, no allowance being made for wheel slippage. During the test the tractor shall be run in the gear recommended for plowing under favorable conditions.

Fuels.—These tests will be made on the lowest commercially available grade of fuel which the manufacturer recommends for the tractor.

Lubricants.—The lubricants used in these tests shall be such as are regularly recommended by the manufacturer for use with the tractor.

Belts.—The belt or belts used in these tests shall be such as the manufacturer recommends for use with the tractor in ordinary operation. No allowance will be made for belt losses.

Insulated Cables

A series of detail changes in the present Standard for Insulated Cable are proposed. These relate more specifically to the armor thickness, tests for braided cable, tests for high tension cable, specifications for rubber covered starting and lighting cable, for varnished cambric insulation starting and lighting cable and for armored starting and lighting cable.

Clutch Release Ball Bearings

A Recommended Practice covering the bore and width of clutch release type thrust ball bearings adopted in 1921 did not come into actual use to any extent, and a committee appointed to see what could be done to make it more acceptable to the industry came to the conclusion that standardization of this item is a hopeless task. It is therefore recommended that the present Recommended Practice for Clutch Release Type Thrust Ball Bearings be cancelled. The Committee is of the opinion that when angular contact bearings are used for the clutch release they should conform in boundary dimensions to the present S.A.E. Standard for such bearings (which at present they do not in a great many cases).

Poppet Valves

A revision of the Standard for Poppet Valves is to be submitted. All of the dimensions of the valves are now to be standardized, with the exception of the valve stem length, which, however, is to vary in even steps of $\frac{1}{8}$ in. in the smaller and in steps of $\frac{1}{4}$ in. in the larger sizes. A table gives all of the dimensions of valves of from 1 to 3 in. nominal diameter, and in footnotes are covered such subjects are grinding of stems, inspection or tests for concentricity and taper of stems, hardening of tips, spring retainers and tolerances.

Clutch Driving Member

It is proposed to put limits on the outside diameter of the clutch driving member. Limits have been fixed already for the flywheel bore, into which the clutch driving member must fit, and it is proposed to set the limits on the clutch disk so that the clearance will range between 0.001 and 0.006 in.

Throttle Levers

In order to harmonize the Standard for Carbureter Throttle Levers with the recently adopted Screw Thread Standard it is proposed to substitute a 10/32 thread for a 3/16 in.-32 thread for the rod ends for carbureters of $\frac{1}{2}$ in. to 1 in. nominal size.

Piston Pins

It is proposed by the Engine Division that piston pins shall be finished to diameters in even sixteenths of an inch and that over-sizes of 0.005 in. and 0.010 in. shall be provided.

Molybdenum Steel

Molybdenum steel, the latest of the alloy steels to come into use for automobile construction, has not figured in the S.A.E. Handbook so far, but now specifications for four such steels have been drawn up by J. D. Cutter of the Climax Molybdenum Co. and approved, after slight revisions, by the Iron and Steel Division for adoption as an

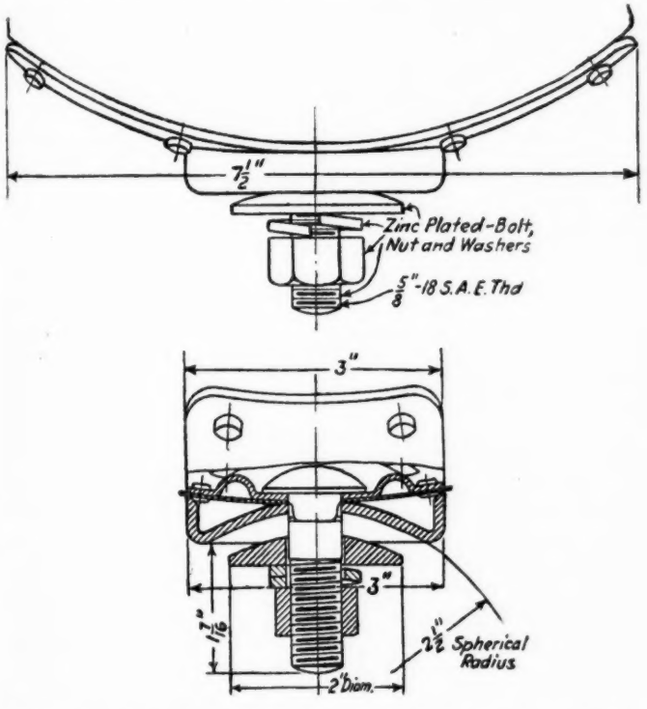
S.A.E. Recommended Practice. If the specifications come into extensive use within one year they will then be recommended for adoption as an S.A.E. Standard. The following table gives the compositions of the four steels.

MOLYBDENUM STEELS SPECIFICATIONS RECOMMENDED

S.A.E. Steel No.	Carbon Range	Manganese Range	Phosphorus, Maximum	Sulphur, Maximum	Chromium Range	Nickel Range	Molybdenum Range
4130	0.25–0.35	0.40–0.70	0.04	0.045	0.50–0.80	.....	0.15–0.25
4140	0.35–0.45	0.40–0.70	0.04	0.045	0.80–1.10	.....	0.15–0.25
4150	0.45–0.55	0.40–0.70	0.04	0.045	0.80–1.10	.....	0.15–0.25
4615	0.10–0.20	0.30–0.50	0.04	0.045	.....	1.25–1.75	0.20–0.30

Motorcoach Headlight Mounting

A headlamp mounting for motor coaches is to be recommended by the Lighting Division. This conforms in most particulars to the headlamp mounting for passenger cars standardized by the S.A.E., with the exception that the bearing surface, bolt and bearing washer are larger, the washer being turned from bar stock. The accompanying drawing shows the proposed design, which is said to have been used with good results.



Proposed universal mounting for headlamps on motorcoaches

Motorboat Bed-timbers

The Motorboat Division recommends the adoption as Recommended Practice of standard bed-timbers for motorboats. For engine with a maximum piston displacement of 75 cu. in. per cylinder (corresponding to about 25 hp.) the bed-timbers are to be placed 16 in. apart, measured on the inside, and blocks are to be fitted along the inside of the bed-timbers for engines not wide enough to reach the timbers. This will cut the expense of replacing an engine with one of a different model.

Motorcoach Nomenclature

A set of Motorcoach Specifications which are intended to serve as a basis for municipal regulations, has been worked out by the Motorcoach Division. These specifications were printed in the June 4 issue of AUTOMOTIVE INDUSTRIES. The same Division has done some work on nomenclature and considers the term motorcoach preferable to motorbus. It has agreed with a committee of the American Electric Railway Association upon the following proposed standard nomenclature:

City Type.—Single-Deck, having cross or longitudinal seats. Double-Deck, having cross or longitudinal seats.

Intercity Type.—Sedan, having multiple side-doors and full-width cross-seats. Parlor, having front and emergency doors and fixed or movable seats separated by an aisle. Both the aisle and chair types of motorcoach have been classified as "parlor," as it is felt that recent development tends toward the same general type.

Compression Type Tube Fittings

The Parts and Fittings Division, which in January last proposed the adoption of standard dimensions for compression type tube fittings but had the three larger sizes referred back to it because the screw threads recommended were not in accordance with the S.A.E. Standard, has rectified this error and is re-submitting the whole list.

Fine Thread Tolerances

In the report submitted at the last annual meeting the Screw Threads Division indicated the screw thread fits that should be used for the different threads specified in S.A.E. Standards and Recommended Practices. No tolerances were recommended for extra fine threads, because the report on screw thread tolerances did not cover series. The Division now recommends the following fit applications:

Class	Fit-Classification
Square Fittings	NEF-C
Taper Fittings	NEF-C
Fuel and Lubrication Tube-Fittings (Soldered and Flared-Types Only)	NEF-C
Oil and Grease-Cup Threads	NEF-C
Tank and Radiator Caps	NEF-B
Tachometer Drive	NEF-C
Three-Joint Propeller-Shafts	NEF-C
Steering-Wheel Hubs	NEF-C

Storage Batteries

A 20-hour rating is proposed by the Storage Battery Division to replace the 5-hour rating of the present S.A.E. Standard. The new recommendation regarding battery rating reads as follows:

Batteries for combined starting and lighting service shall have two ratings. The first rating shall indicate the lighting ability and shall be the capacity in ampere-hours of the battery when it is discharged continuously at the 20-hr. rate to a final voltage of not less than 1.75 per cell, the temperature of the battery at the beginning of such discharge being 80 deg. Fahr. The second rating shall indicate the starting ability and shall be the minimum amperes when the battery is discharged continuously at the 20-min. rate to a final voltage of not less than 1.5 per cell, the temperature of the battery at the beginning of such discharge being 80 deg. Fahr.

REVISED CAPACITIES FOR S.A.E. STANDARD BATTERIES

Battery No.	Minimum Amp.-Hr., 20-Hr. Rate	Minimum Amp. 20 Min.
1	80	95
2	95	111
3	110	127
4	125	143
5	125	137
6	50	57
7	80	95
11	56	...
12	74	...
13	92	112
14	110	134
15	128	156

THE FORUM

Use of Shims in Engine Bearings to Facilitate Repairs

Editor, AUTOMOTIVE INDUSTRIES:

In the design of new automotive parts, especially of engines, far more attention is being given to efficient lubrication than ever before. Also the voice of the service department, which for years cried in the wilderness, is now perceived and listened to, if not as yet taken so very seriously.

As a general rule, things in design which improve lubrication also go a good way toward minimizing service work, but there are a good many instances where this is not the case, of which the most prominent just now is a tendency apparent in engine designing to abandon the use of shims. This is doubtless partly based on a desire to improve the bearing as such, in which case the reasoning is erroneous; and partly upon a desire to save a minute amount in first cost to the utter neglect of much increased service expense at a later stage.

Shims originally came into use when all bearings were hand fitted, at which time they were a manufacturing necessity. The almost complete elimination of hand work has rendered the advantage of shims less apparent in manufacturing plants, but in repair shops and service stations, even the very best equipped, shims are just as great time savers as ever they were.

However, before saying much about the repair end of the industry it is quite proper first to consider the engineering quality of the original new bearing. It is now fairly generally known that grooves, slots and holes in bearings are always bad. Conventional oil grooves intended to lead oil into a bearing usually merely serve to break the oil film and render the formation of a proper film impossible. Of course some means for introducing oil is necessary, which means that there must be a hole somewhere, either in the bearing or in the shaft, and from this hole a single groove parallel to the axis of the shaft is useful in aiding the entrance of oil. The rest of the bearing should be smooth.

This is the theoretical situation, but practically it is desirable to provide some means for trapping particles of dirt. That is, to have some groove which will provide an exit from the bearing so that dirt will at least be given the opportunity of escape instead of being held where it will do a maximum of scoring before being ejected.

In engines with splash lubrication or quite low pressure pump feed, it is customary to provide quite large clearance between shaft and bearing at the junction between the bearing and cap. From the viewpoint of oil film formation, this divides the bearing into two halves which function separately and, since the direction of load is alternating, the chances of good film formation in the two halves separately are probably slightly better than in a continuous bearing. Of course, the bearing surfaces themselves should be smooth and innocent of grooving.

Construction of this sort is not possible where high oil pressure is used, because the rapid escape of oil would inevitably provoke over-lubrication of the cylinders; still even here some relief is essential and a very good one is a single axial groove which lets out enough oil for the cylinders and also permits dirt to escape.

In an automobile engine bearing of the kind just considered the exact position of an axial groove is a matter of small importance. An oil film is always wedge shaped and with steady loading the wedge will acquire a precise position depending upon the load, the speed and the rate of oil feed. With load which is constantly varying in amount and direction the position of the "wedge" will fluctuate. Now, the maximum loads both on main bearings and on connecting rod bearings occur near the top and near the bottom of the stroke, so oil grooves should be reasonably far removed from the vertical centerline. In a good many aviation engines with high pressure oil it was found to increase bearing life when the crank pins were drilled at such an angle that they had considerable lead over the lines of greatest stress. The only thing that could account for the decreased rate of wear was the assumption that, with the inclined oil hole, a better oil film was present in the areas of greatest loading. Practically it is, of course, always easiest to provide a groove or relief at the junction between the bearing halves. Theoretically it follows, from the foregoing, that this is prob-

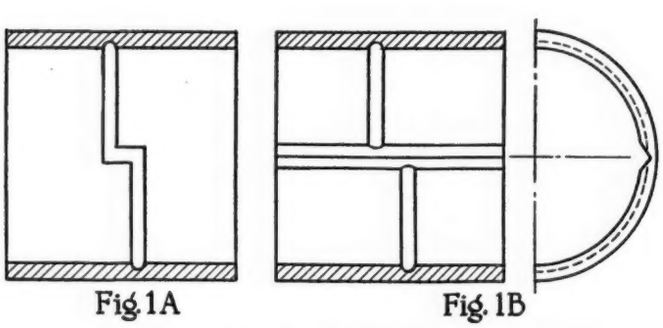


Fig. 1A Fig. 1B

A shows a good design of connecting rod bearing as intended to be fitted; B how the same bearing is most likely to appear after a repair shop has adjusted it

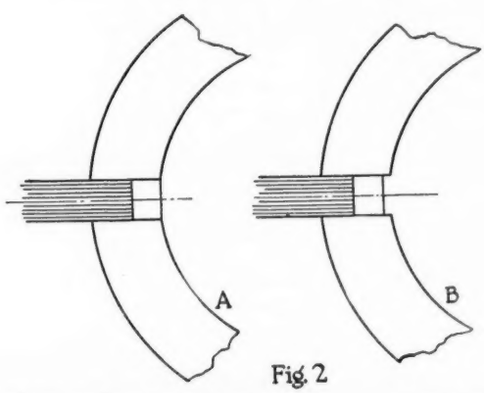


Fig. 2

A shows a bearing similar to Fig. 1 designed for babbitt faced shims and B about the worst the repair shop is likely to do to it

ably the best place, too; in any case the horizontal centerline is very close indeed to the theoretically best position.

Thus with splash or very low pressure lubrication there is no theoretical objection to the provision of fairly wide horizontal relief such as is given with plain shims. With higher pressure this degree of relief would be too great, but the babbitt edged shim completely answers this problem.

Coming back to the service end, the writer has had occasion in the last few years to get a fairly close insight into the work done by large repair shops, by truck fleet owners and by small garages. Only a small proportion of engine overhauls takes place in shops that have any connection with the manufacturer and the best work is almost always done by old-fashioned methods with old-fashioned tools.

Where shims are not used originally one or other of two things happens, both bad. Either the bearing caps are filed down, whereby they often end up far from true, or when new bushings are provided shims are hand cut to lessen the labor of scraping away much babbitt. A bearing originally intended to have only very slight central grooves is liable to leave a repair shop with slots a sixteenth inch square on either side due to the introduction of shims not provided for in the design.

Another favorite trick of repair shop mechanics of the very best class is to bevel off the babbitt so as to give a vee groove each side. When babbitt faced shims are provided they will often scrape these back further than they should, but they do not bevel the edges of the bearings, and even though the relief be made a little too large it is not liable to be nearly so much exaggerated.

With shims, especially the now almost universal laminated type, 99 per cent of mechanics will do a better bearing job. It seems hardly necessary to point out how much quicker a job. The writer recently had refitted an engine used for laboratory test work. The three main bearings were shimless and had to be carefully fitted for high pressure oiling. The crankshaft was reground and standard replacement bushings obtained. Scraping these by hand occupied one man several days. The six connecting rods had babbitt-faced laminated shims and all six were refitted in a few hours. In overhaul jobs the peeling of a few shim laminations usually calls for only the lightest touching up of the bearing surfaces and getting to the bearings often involves more time and cost than refitting them. In doing light scraping of this sort the mechanic is very unlikely to introduce his own ideas as to bearing grooving, so the engine has the best chance of going together again in the proper condition; in such bearing condition that the oiling system will function as it did originally.

The reputation of any particular make of car depends mainly upon the average operating condition after two or three years of use, which involves the facility with which service stations can restore the original excellence of performance. In engine performance lubrication is of prime importance and in turn depends to a great extent on proper bearing fitting. A. LUDLOW CLAYDEN.

Storage Battery Rating

Editor, AUTOMOTIVE INDUSTRIES:

I find on page 874 of the issue for May 14 a discussion of the proposed change in the method of rating automobile storage batteries. The statement attributed to me that the 20-hour rating would lower the catalog figures for the batteries and would therefore make it undesirable from the commercial standpoint is evidently based on a misunderstanding.

At the meeting of the Standardization Committee of the Automotive Electric Association in Cleveland I discussed the rating of these batteries and pointed out that the 5-hour rating which was adopted some years ago by the Society of Automotive Engineers and the Motor Transport Division of the War Department had met with objections because the capacities were considerably smaller than on the 5-ampere basis. The reluctance of manufacturers to put the smaller figures in their catalogs was perhaps to be expected.

The new proposal to rate these batteries at the 20-hour rate has certain obvious advantages. The capacities at the 20-hour rate and the 5-ampere rate are not materially different. The smaller batteries will have a higher rating at 20 hours than at 5 amperes and the larger sizes will have a rating that is only slightly less. The 20-hour rating affords a satisfactory basis of compromise and is free from the technical objections which make the 5-ampere rating undesirable.

Several manufacturers have indicated their willingness to include the 20-hour ratings in their catalogs and it is believed that others will do the same when the matter is presented to them. GEORGE W. VINAL,
Physicist, U. S. Bureau of Standards.

Next Week — the Engineering Issue

THE latest trends and developments in automotive engineering will be outlined next week in the big annual Engineering Issue of AUTOMOTIVE INDUSTRIES.

Among the features prepared especially for this issue will be articles on Practical Commercial Application of Automotive Research, Calculations of High-Speed Engine Design, Lacquer Finishes, Commercial Airplane Design in America, Oil Dilution Cures, Body Design, and the second part of P. M. Heldt's paper on Unconventional Transmissions.

A separate section will be devoted to the 1925 Summer Meeting of the S. A. E., at White Sulphur Springs, reporting the sessions so that the busy executive quickly can get a picture of what happened.

HEREAFTER the screw thread series which have been known in the past as the S. A. E. Regular and the U. S. Standard, will be known as the Fine Series and the Coarse Series, and be designated by the letters F and C, respectively. These screw threads are now a National Standard. A system of identification for threads has been worked out which fully specifies the thread. This consists of (1) the diameter of the threaded part, (2) the pitch or number of threads per inch, (3) the letter N designating that the thread is in accordance with the American standard, (4) the initial letter of the thread series, and (5) the number of the class of fit (loose fit being Class 1, free fit Class 2 and medium fit Class 3). Thus a ½ in. -20 thread, free fit, will have the following designation: ½ in.-20-NF-2. If the thread is left hand the letters LH are inserted after the pitch number, the designation of the above thread, for instance, then becoming ½ in.-20-LH-NF-2.

Piece Work System Best Incentive for Individual Production

Such is conclusion of W. C. Dickerman after review of numerous other plans which have been evolved to produce higher grade of workmanship. Industrial representation seen as hope of future.

STEADY, efficient production is the keystone of success in modern industry. This is especially true of the automotive industry, where keen competition has pushed retail prices so low that manufacturers have been able to continue successful operations only by taking advantage of every opportunity to increase production.

Incentives for individual production is the subject treated in this abstract from Mr. Dickerman's paper. He outlines the principal methods that have been evolved of recent years to stimulate employees to maximum production and forms the conclusion that some form of industrial representation probably holds the greatest promise for future success in this direction.

THE effort to interest employees in their work and to stimulate production is as old as civilization, but there has been a considerable improvement in methods, according to W. C. Dickerman, vice-president of the American Car & Foundry Co., in a paper read before a group of manufacturers at the annual meeting of the United States Chamber of Commerce in Washington.

One of industry's greatest problems is the stimulation of the man power element, said Mr. Dickerman. Man, being individual, and controlling within himself his motions and motives, can, at will, give himself unreservedly or restrain himself markedly. Leaders of industry desire the man's unrestrained efforts and have for centuries addressed themselves to the cultivation of what may be termed "the will to work" on the part of employees.

In the early centuries the common incentive for individual production was the lash of the taskmaster. In contrast with that and other equally unintelligent incentives, however, we find today an approach directed to the physical, intellectual and financial development of the workman; a full appreciation of the mutual obligation of the employer and employee, and a desire to improve the interests of the workman by methods sometimes paternalistic and frequently amazingly generous. These methods may be roughly grouped under the following headings:

Thrift Plans; Mutual Benefit Associations; Pensions; Piece Work Systems and the Step-Up Bonus; Production Bonus; Profit Sharing; Stock Participation Plans; Industrial Representation.

Thrift Plans are intended to promote savings, to provide for unforeseen emergencies and to make provisions for family deaths or other adversity. The plans vary with human ingenuity. Sometimes the plan is compulsory, most frequently permissive, and promoted by plant propaganda. In many instances the management supplements the employee's savings most generously. Usually in this event, there is a requirement for continuity of employment. In all cases the deductions are made by the employer with the necessary advices to the employee.

The margin between poverty and comfort with the average workman is surprisingly small. The peace of mind resulting from accumulated savings is evident—a better workman must result.

Mutual Benefit associations have had a marked growth in the last twenty-five years and failures have been comparatively few. They are three kinds: First, those administered solely by the employees; second, those administered jointly, and third, those administered by the employer. There is apparently little choice save that when the company is large and the membership inclusive, it is better for the company to administer, as it should bring to the operations of the association more experience in management. With the benefit association, the individual incentive is again indirect and arises from the assurance of a properly protected future.

A properly devised pension system should promote individual efficiency, reduce labor turnover, attract superior workmen, increase thrift.

Few have accomplished these purposes. This may be due to the youthfulness of the plan. Of 141 plans examined, all but one post dated 1889 and most had been installed in the last twenty years. A number have had to be revised with a reduction in pensions paid. It is not improbable that as time passes they will more nearly accomplish their purpose. At present they do give aid to those derelicts who having given their fruitful days to industry, find themselves without means of support. By compulsory retirement they take from active work the man who, through age disabilities, has become a menace to himself and to his fellow workmen.

Ignoring the humanitarian side, obviously the incentives thus far outlined influence by creating a favorable atmosphere in which the workman is disposed to exert himself. In this they are most commendable and are valuable accessories. Thrift plans and benefit associations, where they are compulsory, sometimes engender antagonisms through their paternalism. In the smaller communities where well established lodges of the Moose, Eagles, Red Men or kindred organizations exist, it is better to permit them to function than to enter into competition with them. More and more, however, the workman is assuming the establishment of a well planned and stable pension system as his natural prerogative. A note of caution should be sounded here. A knowledge of the cost of such systems should be had and the necessary reserves established before the plan is put into effect.

Among methods which have a direct appeal, the chief is the piece work system. It has been in vogue for centuries. Where preceded by accurate time studies, assuring the continuity of its rates, it gives an absolute control of cost, and to the workman an opportunity to exert himself to the utmost, with the knowledge that he will receive his full reward. In cases where the continuity of operations has become unbalanced or where a large production is essential, a piece work system, combined with a generous step-up bonus, will give marked results. A step-up bonus may be described as premium paid for output above normal and in proportion to the increase. If time studies disclose that it is reasonable to expect 20 operations per hour per machine and the rate established is three cents each, the step-up bonus will pay three and one-half cents for each operation over 20 and up to 23, and four cents for all operations over 23 in number.

The piece work system probably will always remain the prime incentive. Easily understood, it stimulates the individual.

Profit Sharing Plans

A Profit-Sharing Plan has been defined as "the announced plan to set aside, or divide a fixed percentage of the net profits of the concern, for the account of the employees, according to some predetermined plan." In 1923 it was estimated that there were less than one hundred real profit-sharing plans operating in the United States. There are doubtless more today as the interest has been a growing one.

Some provide for a direct distribution among the workers in cash of a substantial portion of the net profits without regard to seniority. The more prevalent type distributes a portion of the net earnings in cash and a further portion in profit sharing certificates or capital stock. This form usually contemplates preferences in the profit rate for seniority of service. In some instances a fund is established intended to act as a reserve against losses.

One cannot help being impressed by the generosity with which most of the plans have been drawn; a number distribute fifty per cent of the net earnings among the employees. Particularly with public utilities, there can be no doubt of the effective stimulation resulting from a well-digested profit-sharing plan. Its success presupposes a well established business without prolonged periods of depression.

Normally the demand for efficiency is greatest where business conditions are most competitive and it is here that profit sharing loses much of its effectiveness, because it follows, as a natural sequence, that profits are slight, or non-existent where competitive conditions prevail.

Stock Participation Plans

Stock Participation Plans are the growth of the last ten years. They are most effective in companies where stable earnings are reasonably well assured and where the administrative personnel is large in number. The average workman has little knowledge of the influences that affect the rise or fall of capital stock values and is apt to be little stimulated by the small income return that he receives. There are two methods of distribution in vogue. In one the employee pays for his stock either in full or in part from wages. In the other the stock is given as a bonus or bonus money is taken in payment for stock. Both necessitate a scheme for financing with the attendant difficulties in case of discharge or separation. Both assume the risk of the business and depend on its financial success for their greatest benefit. Stock distribution plans are also least effective when competition is keenest. Great care must be taken to see that the promotion efforts are not too roseate.

Industrial Representation is the joint assumption of certain features of managerial control by representatives of management and employees. The plans of operation are grouped into two major divisions, the Committee and the Industrial Democracy types. There is a third type, really a regrouping of the committee plan, known as Employees' Associations. These are largely found in public utilities and provide for employee membership in the Associations before participating in representation.

The committee plan of works council may be composed either of employees only, who meet with a representative of management, or of equal representation of men and management which meets in joint conference. The ordinary committee plan consists of a control council with a series of sub-committees representing the various departments or dealing with important policies, such as hours of work, wages, safety, health, etc.

The Industrial Democracy type is modelled after the Federal Government and is consequently more complicated. There is a congress of workers, a senate of foremen, a cabinet of company executives, with the president of the company at the head. This type has been found cumbersome as it does not provide for a direct channel between the workman and management. It has, therefore, undergone some changes in this respect.

The earliest Works Council in the United States was introduced in 1904 by the Nernst Lamp Company of Pittsburgh, and was of the committee type. The plan has since been abandoned due to several changes in management. In 1907 the Nelson Valve Company of Philadelphia established what may be called the forerunner of the Industrial Democracy type. This consisted of a Lower House of employee representatives and an Upper House of foremen. This plan has also been abandoned. In 1913 the Packard Piano Company installed a true Industrial Democracy type of employee representation. In 1915 the Joseph and Feiss Company formed an Employees' Association. These are the first records of the various forms of employee representation plans.

Growth Has Been Steady

The growth has been steady, and is evidenced by the following data furnished by the National Industrial Conference Board:

	1919	1922	1924
No. of Works Councils in operation	225	725	814
Total employees represented	391,400	690,000	1,177,037

With a development so young, obviously too much cannot be expected. However, sufficient trial has been given to make evident certain facts essential for success. Basically, the employer and employees must be not only ready for, but welcome, the plan. The employer must remember always the effect of past ages of distrust and suspicion and be prepared for slow results. He must be sure of his own men. Operating personnel prefers to command, is slow to discuss, and often shows a secret but effective oppositior.

The plan must be comprehensive and give wide latitude to the control of wages and hours of work. In the wage, we touch the nerve center of the industrial body. From it radiates all other interests. This is fundamental and still a wide divergence exists. The International Harvester Plan gives control to the representative body subject to appeal only in case of a disagreement. The Colorado Coal and Iron Company Plan gives little or no control to the representative body. In a form of Industrial Representation lies the industrial hope of the future. The progress made in the last ten years is an earnest of what can be expected as the years pass.

Exports of Cars, Trucks, Tires and Parts for

COUNTRIES	GASOLINE PASSENGER CARS										TRUCKS					
	Up to $500		$500 to $800		$800 to $1200		$1200 to $2000		Over $2000		Up to 1 ton incl.		1 to 2½ tons		Over 2½ tons	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Austria			2	$1,581	3	$3,024			4	$10,408						
Azores and Madeira Islands	13	$3,730	1	800	4	4,706										
Belgium	193	70,082	34	24,995	89	97,698	49	$73,033	3	7,925	96	$34,764				
Bulgaria																
Czechoslovakia	1	315	3	2,140	6	6,329	2	2,668								
Denmark	778	284,426	69	52,916	60	60,806	6	9,092	2	9,342	627	227,025				
Esthonia																
Finland	3	1,200	59	42,211	35	35,973	16	23,471	2	5,204			12	$9,638		
France	1	477			37	42,992	24	38,776	15	39,445						
Germany	1	469	128	90,374	121	127,842	83	133,749	29	75,903	40	28,013	9	6,779		
Greece	3	1,078	49	39,003	22	22,512	9	12,814	2	5,794	2	1,236	8	8,512		
Hungary			1	730												
Iceland and Faroe Islands							1	1,372								
Italy	684	243,270	1	700	4	4,718			8	24,639	547	140,489				
Latvia																
Lithuania																
Malta, Gozo and Cyprus Islands	6	1,848	1	715	1	1,166					1	395				
Netherlands	25	14,714	63	44,544	177	187,464	86	128,926	16	42,601			8	11,553	2	$6,500
Norway	30	10,862	39	28,055	37	38,161	10	14,186			6	5,105	9	12,834		
Poland and Danzig			13	10,058	46	48,860	16	22,150	7	17,422	1	777				
Portugal	41	20,114	4	2,347	31	31,817	3	4,253	2	5,000	3	1,586	2	1,684		
Rumania			4	3,000	13	12,879	5	7,345	1	3,066	8	4,000				
Russia	25	7,500					9	17,442	12	34,510	25	12,900				
Spain	211	76,679	188	147,224	295	313,368	276	439,065	36	97,698	166	58,572	24	27,643		
Sweden	104	35,710	134	98,730	213	222,504	84	119,081	7	16,388	41	44,411	25	20,072		
Switzerland			29	19,795	35	35,368	20	28,706	12	29,692						
Turkey					5	5,746	10	15,298								
United Kingdom	50	23,304	985	687,281	446	462,353	366	520,785	63	172,137	49	47,582	44	47,272	6	18,520
Irish Free State	3	1,100	37	28,099	8	7,708							2	2,143		
Yugoslavia, Albania, etc.			3	1,976	7	6,678	2	2,944	1	2,602						
United States																
British Honduras	1	351														
Canada	128	34,998	328	209,753	377	368,465	196	283,668	70	190,065	27	20,257	157	242,665	14	38,376
Costa Rica	1	337	9	7,173	4	3,766	2	3,249			2	904	4	7,669		
Guatemala	1	484			17	16,448	17	24,102			1	915	16	21,222		
Honduras					1	1,133	1	2,000					1	1,448		
Nicaragua	1	453	3	2,351	4	4,219	1	1,372			1	259				
Panama	7	2,766	6	4,094	18	18,752	9	14,111	3	8,721	18	7,907	1	1,187		
Salvador	3	1,060	12	9,418	14	14,411	7	10,521	2	5,000			3	3,800	4	16,650
Mexico	560	182,332	141	106,476	235	236,264	61	86,712	17	51,043	198	77,835	29	37,680		
Miquelon, St. Pierre, etc.																
Newfoundland	4	1,472	9	6,755	10	11,503	3	4,763			3	1,567				
Barbados					3	3,352							3	5,126		
Jamaica	10	3,800	14	10,176	7	7,241	2	2,978			15	5,280				
Trinidad and Tobago			8	5,578	1	1,003										
Other British West Indies	21	8,718	3	1,810	3	2,920	1	1,273			17	7,928	1	1,977		
Cuba	650	226,742	72	48,608	87	87,618	57	79,731	34	90,769	201	64,797	30	38,780	15	45,909
Dominican Republic	18	6,790			7	7,048	4	5,770			5	2,366			3	11,214
Dutch West Indies			3	2,317			1	1,629			8	3,335				
French West Indies											4	1,452				
Haiti	6	2,160														
Virgin Islands	3	1,475	10	8,240	4	3,795	2	2,798	1	2,534	6	2,288	10	8,998	1	1,160
Argentina	2	740														
Bolivia	855	318,384	468	363,160	348	376,556	97	142,367	27	89,298	49	18,563	19	29,961	14	46,474
Brazil			13	9,816	2	2,314	3	4,339	5	14,003			1	1,401		
Chile	887	322,632	250	191,247	524	505,550	23	33,577	65	178,458	403	132,064	28	34,156	3	12,015
Colombia	100	21,014	44	31,008	21	22,775	5	7,055	1	3,199	35	26,536	20	26,659	6	21,812
Ecuador	40	15,188	26	19,893	35	36,322	17	24,503	2	5,662	20	10,074	28	22,887	1	2,400
British Guiana	3	1,340	2	1,571	6	5,859	4	6,046			28	11,966	2	2,379		
Dutch Guiana									1	2,500						
Paraguay	1	491														
Peru																
Uruguay	29	11,346	24	17,821	52	58,192	3	4,572	2	5,799	67	27,797	88	105,464	1	2,909
Venezuela	321	93,080	38	29,123	42	46,254	13	18,790	5	17,271	60	14,344	3	5,036		
Aden	90	35,307	14	11,004	60	63,226	17	26,117	5	12,597	49	26,113	11	16,565	4	18,727
British India			1	783												
Ceylon	54	18,325	103	82,286	53	54,647	2	2,788			100	78,977	25	29,200	4	4,992
Straits Settlements	14	6,430	13	10,105	15	15,489	2	2,896			33	31,919	18	24,658	1	2,130
Other British East Indies	1	450	54	41,858	37	40,106	6	9,031					4	1,982		
China																
Chosen	39	12,879	53	38,452	28	29,447	13	18,620	5	13,128	13	4,196	2	1,911		
Java and Madura																
Other Dutch East Indies			35	24,742	37	41,319	12	18,437	2	5,000	8	3,928	1	500		
French Indo China			8	4,648	5	5,196	5	7,609			2	1,913	3	2,534		
Hejaz, Arabia and Iraq	5	1,800	4	3,506							5	1,760				
Hongkong	44	15,632														
Japan	35	12,300	6	4,500	2	2,044	1	1,463			23	9,592				
Kwangtung	6	2,994	27	15,623	40	37,648	5	7,130	3	7,611	20	8,080				
Palestine and Syria			4	3,074												
Persia	75	21,900	9	6,714	20	21,707	18	25,763			2	1,328	3	4,966		
Philippine Islands	48	15,948	1	580												
Siam	235	90,896	47	35,931	91	93,124	16	23,369	3	10,085	178	68,276	10	10,186		
Turkey	4	1,760														
Australia	6	2,056														
New Zealand	1,984	740,743	1,420	959,622	1,505	1,566,392	287	421,793	22	57,811	437	264,526	162	184,799	54	185,820
British Oceania	457	220,653	140	101,863	372	395,663	90	128,043	8	18,834	91	57,144	47	62,657	10	21,032
French Oceania	1	491									1	380				
Other Oceania																
Belgian Congo																
British West Africa			5	3,769							2	1,008				
British South Africa	140	66,891	274	214,618	481	516,244	54	76,328	2	4,342	19	17,280	72	78,895		
British East Africa	65	33,749	38	23,867	23	24,061	7	9,607	1	4,400	42	38,393	25	31,023	1	1,747
Canary Islands					8	8,853	2	2,744			26	13,388	4	10,068	1	2,500
Egypt	12	6,289	3	2,354	7	7,113	1	1,500			6	3,000				
Algeria and Tunis			2	1,495			2	2,631			3	1,950				
Other French Africa	17	5,292														
Liberia											31	12,328	1	1,086		
Morocco	83	29,387			1	1,008	1	1,372			30	12,832				
Portuguese East Africa					8	9,340										
Other Portuguese Africa					3	2,553										
Spanish Africa	6	2,416			1	1,908	1	1,372			6	2,208				
Total	9,245	$3,399,619	5,591	$4,005,062	6,314	$6,558,620	2,148	$3,169,695	508	$1,397,906	3,907	$1,705,799	975	$1,206,986	145	5$460,887

April, 1925 — Canadian Exports

ELECTRIC VEHICLES		PARTS	TIRES						PASSENGER CARS						TRUCKS		PARTS	COUNTRIES
			Casings		Inners		Solids		Up to $500		$500 to $1000		Over $1000					
No.	Value	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	Value	
		$1,006	551	$9,194	519	$1,111	20	$619										Austria
		211	20	152														Azores and Madeira Islands
		273,610	1,864	33,356	1,296	3,156	2	175			1	$736						Belgium
		1,575																Bulgaria
		391	377	8,826	211	657	69	1,989										Czechoslovakia
		637,594	11,277	105,043	16,671	18,672	126	4,132	75	$33,265							$2,149	Denmark
		120																Esthonia
		8,424			1,199	2,275			4	1,615	2	1,504			2	$612		Finland
		405,085	1,550	24,619	1,868	4,563	10	156										France
		78,327	265	8,384	330	1,243					4	3,007					7	Germany
		19,258	628	8,955	563	871	84	2,013	17	7,451	2	1,266						Greece
		2,346																Hungary
		978	109	1,077	177	177												Iceland and Faroe Islands
		192,203	1,344	13,796	874	1,912	46	1,029										Italy
		71																Latvia
		45																Lithuania
$6,500		1,253							2	824								Malta, Gozo and Cyprus Isls.
		26,484	4,669	49,024	4,073	7,662	2	95									167	Netherlands
		15,165	1,650	29,995	2,446	4,337	34	1,437	10	4,054	5	3,905					13	Norway
		8,894	1,399	18,847	1,820	3,381	60	1,768										Poland and Danzig
		5,392	260	3,273	265	516												Portugal
		3,224	171	2,256	328	604			16	6,732	1	999	4	$4,950				Rumania
		33,737	25	323	32	126	613	16,362										Russia
		152,075	2,481	23,311	2,598	4,410	69	3,448									113	Spain
		54,330	3,099	44,591	2,725	3,287	151	7,342	33	13,266	14	8,655					6	Sweden
18,520		10,651	573	14,787	371	1,599	6	101			2	1,937	2	2,627				Switzerland
		1,563															5	Turkey
		529,421	12,897	143,846	7,069	10,172	3,250	74,244	5	1,295	1	938	9	9,801	100	14,870	13,172	United Kingdom
		40,617	176	1,191	472	462												Irish Free State
		483	115	1,327	190	274			6	2,600							1	Yugoslavia, Albania, etc.
38,376									5	1,325							19,397	United States
		294	9	161	14	43												British Honduras
2	$2,101	2,585,128	1,272	23,148	1,155	4,079	160	3,825										Canada
		1,602	204	3,042	210	447			4	1,657							63	Costa Rica
		3,651	418	7,637	354	905												Guatemala
		2,514	95	2,616	137	394	26	1,170										Honduras
		2,296	145	2,045	276	519												Nicaragua
16,650		12,944	1,810	22,758	2,154	3,329	55	1,777									31	Panama
		2,614	188	3,337	258	641	8	242										Salvador
		170,042	7,859	93,407	6,556	12,387	120	2,391										Mexico
															1	322	528	Miquelon, St. Pierre, etc.
		2,388	510	5,050	539	919	14	454	2	806	6	5,294	1	1,084			107	Newfoundland
		4,221	18	181	24	84	6	96	4	1,360					4	1,288	41	Barbados
		13,332	396	3,846	258	339	42	795	16	6,585	10	8,566	2	2,257			27	Jamaica
		7,160	309	4,078	264	474			21	7,618					10	3,220	195	Trinidad and Tobago
45,909		4,438	147	1,836	132	201	3	53	3	1,256							148	Other British West Indies
11,214		119,052	7,856	88,882	14,092	20,359	1,632	39,740									217	Cuba
		5,168	1,491	17,648	2,255	3,205	52	1,796										Dominican Republic
1,169		1,740	326	3,002	314	529												Dutch West Indies
		1,509	91	728			18	300										French West Indies
46,474		6,736	172	2,597	282	565	8	185	10	4,030								Haiti
		292	50	518	90	109												Virgin Islands
12,015		793,601	20,276	218,878	31,923	47,632	295	10,482	148	60,342	27	22,253	26	35,332			51,957	Argentina
21,812		2,827	175	3,143	237	559	2	37	14	5,493			4	4,452			11	Bolivia
2,400		695,064	13,802	126,150	14,564	16,660	42	826	538	220,137	106	88,786	46	54,057			95,361	Brazil
		70,392	1,987	30,347	1,143	2,202	42	1,068	4	1,563	3	2,726	10	13,223				Chile
		28,563	675	14,748	966	2,881	34	1,276	9	3,615								Colombia
		5,472	145	2,563	239	576	4	106			1	873	8	9,241			14	Ecuador
		446	12	120	20	20			2	846					6	2,152	26	British Guiana
2,909		600	49	513	40	81												Dutch Guiana
		1,091									1	865	1	1,142				Paraguay
18,727		69,013	1,511	23,702	1,836	3,788	23	1,003	2	836	2	1,842						Peru
4,902		37,200	3,158	43,334	3,679	5,980			91	38,694	7	5,368	2	3,091				Uruguay
2,130		38,535	3,245	37,688	5,492	9,169			25	10,145	1	628			2	692		Venezuela
		179	5	55					9	2,538								Aden
		63,576	1,632	16,691	1,210	2,009	242	6,283	288	113,466	25	17,200	5	5,040	35	11,797	1,559	British India
		13,838	391	4,936	306	591			38	15,862	7	5,528			16	5,492	1,052	Ceylon
		42,922	612	6,465	163	353	194	4,205	239	74,082	23	14,579			37	11,870	32,160	Straits Settlements
			8	76														Other British East Indies
		21,043	1,016	11,533	1,696	3,204	27	396	7	2,953	14	12,510	15	23,839				China
		2,135																Chosen
		25,059	2,395	24,159	720	1,135	221	5,789	293	85,735	37	30,147	15	18,000	61	20,152	16,494	Java and Madura
		4,694																Other Dutch East Indies
		1,638																French Indo China
		1,298	24	360	144	225			12	4,988			8	8,952			64	Hejaz, Arabia and Iraq
		12,171											3	3,425				Hongkong
		107,467	4,921	45,273	1,399	2,204	238	3,815	12	4,835	21	17,639	6	8,795				Japan
		2,361	5	53	6	13												Kwangtung
		11,752	92	1,750	128	379												Palestine and Syria
		346			252	454												Persia
		49,652	9,299	89,104	5,731	9,227	365	7,603										Philippine Islands
185,820		581							13	3,524					18	5,820		Siam
21,032																		Turkey
		360,996	9,494	133,169	9,150	24,236	1,394	43,854	1,157	349,094	6	3,162			594	189,716	42,445	Australia
		77,907	4,383	61,526	3,741	6,975	683	29,479	594	225,576	200	148,248	8	8,482	133	45,372	31,057	New Zealand
		971	38	606	61	144									1	322	248	British Oceania
		1,971	4	27			12	400										French Oceania
		267	536	10,916	599	1,460			2	871								Other Oceania
		8,988	5	107	6	22			3	1,209								Belgian Congo
1,747		31,835	94	1,282	108	180			27	8,138					45	14,961	5,969	British West Africa
2,500																		
6	11,351	85,417	1,579	23,436	2,173	3,124	141	3,497	205	85,705	22	15,427			6	1,932	8,272	British South Africa
		16,540	386	4,741	320	479			36	13,185	1	739			52	18,614	2,153	British East Africa
		1,441	316	4,109	399	625	42	2,302	4	1,427	1	739						Canary Islands
		9,097					20	566	4	1,514								Egypt
		112													7	2,254	9	Algeria and Tunis
		1,222	146	1,841	158	481												Other French Africa
			5	120	8	18												Liberia
		5,203	16	274	8	23												Morocco
		2,238							23	9,847					4	1,288	44	Portuguese East Africa
		2,163	1	25	1	3												Other Portuguese Africa
5$460,887		1,144	50	673	50	81	8	194										Spanish Africa
8	$13,452	$8,162,683	151,352	$1,777,093	164,138	$268,089	10,175	$290,915	4,032	$1,441,959	553	$426,066	175	$217,790	1,134	$352,746	$325,273	Total

Nickel Consumed by Automotive Industry Totalled 9,000,000 lb. in 1924

More nickel-steel being used for case hardening parts. Tendency to increase thickness of nickel plating grows.

LAST year the automotive industry consumed something like 9,000,000 lb. of nickel.

Of this total about 75 per cent consisted of nickel used in automotive steels, while the remaining 25 per cent was made up of nickel used in castings and in plating.

Comparison of data for 1924 and 1923 indicates that there was little change in automotive consumption of nickel during the two years. Although passenger car production last year was some 10 per cent less than in 1923, the use of nickel in Timken roller bearings in 1924 for the first time brought the total consumption of nickel steel slightly above the 1923 total. A tendency to increase the thickness of nickel plating and to use more nickel in castings also helped to hold up the consumption.

These facts, compiled recently by the development and research department of the International Nickel Co. in collaboration with AUTOMOTIVE INDUSTRIES, indicates the part which the automotive industry is playing in the business of the nickel industry. The trends in automotive use of nickel are important in giving engineers a better idea of what other designers are doing along this line and in impressing the importance of this phase of automotive construction.

The greatest consumption of nickel in the automobile industry is through the use of various nickel, chrome-nickel, nickel-molybdenum and nickel-chromevanadium alloy steels. The last twelve months have seen a marked increase in the use of nickel bearing steels for various case-hardening purposes. The development of the nickel-molybdenum case-hardening steel has met with considerable favor for parts where maximum hardness of the case is desirable. The use of 5 per cent nickel-steel for case-hardening parts has increased considerably where maximum toughness and wearing properties are required, as in steering worms and gears, transmission gears and rear axle pinions. On cars weighing from 3000 to 3500 pounds, the following are typical rough weights of nickel-steel required to produce the part:

2 steering knuckles	16 lb.
2 steering knuckle arms	7 lb.
2 steering knuckle pins	3 lb.
1 steering arm	3 lb.
4 steering ball joints	2 lb.
8 spring clips	13 lb.
Transmission gears	40 lb.
Transmission spline shaft	7 lb.
Rear axle ring gear	20 lb.
Rear axle pinion	8 lb.
Differential gears and pinion and cross	16 lb.
2 rear axle drive shafts	24 lb.
Connecting rod bolts—bearing studs, keys	6 lb.
Wrist pins	4 lb.

Many other parts are made of nickel or chrome-nickel-steel, depending on the individual design, such as front axle centers, crankshafts, connecting rods, cam shafts, inlet valves, water pump shaft of 20 per cent nickel-steel, steering gear shaft, worm and gear, frame, brake levers, etc. Some of the higher priced passenger cars use from 1000 to 1200 lb. of nickel-bearing-steel per car, while some trucks employ 2500 lb. in their construction.

Other places in which nickel is used in automotive construction is in aluminum die and other castings where from 2 to 4 per cent commonly is employed. This addition makes a marked improvement in the strength of the casting and adds materially to its hardness, color and the degree of lustre produced by polishing. This composition is quite common in steering wheel spiders, spark throttle control levers and other exposed parts which require a high finish. Similar quantities of nickel are added to aluminum pistons with a marked increase in their hardness. Spark plug wire consumes a considerable quantity of nickel as the electrodes almost invariably are an alloy of nickel with 2 to 4 per cent of manganese. Monel metal, which contains 67 per cent of nickel, is used to some extent for this purpose. The high corrosion resistant properties of monel metal result in its use in such parts as carbureter needles, gasoline strainer screens and by some in trim parts, which usually are nickel-plated, trunk hinges, bow sockets, exposed bolts, exhaust manifold studs and bolts, and inserts in vulcanized rubber door handles.

Nickel-silver in which the nickel content varies from 12 to 30 per cent, also finds similar uses. The addition of nickel to heavily leaded bronzes has a marked influence in preventing the segregation of the lead and is used in percentages from 1 to 1½ in several of the well known plastic bronzes.

Increased Use in Cast Iron

There is a growing use of nickel as an alloying element in cast iron; Mayari pig iron has long been used for this purpose. Nickel used by itself or with chromium, when in the proper proportions, results in increased tensile compression and shearing strength of the iron and improved toughness.

Results of a number of tests have shown that the addition of nickel materially improves the wearing properties of iron and additions of ½ to as high as 2 per cent of nickel quite commonly are used for this purpose. The addition of nickel to cast iron prevents the formation of chilled spots so that the hardness of the iron is increased either by using a lower silicon content or by the addition of chromium without adversely affecting, and probably improving machinability. The addition of from ¾ to 1½ per cent of nickel in pistons eliminates the necessity of softening this part by annealing while the addition of a small quantity of nickel to piston rings has been found to improve their machinability.

Resistance wire coils used in connection with the ignition coil invariably are made from a nickel base alloy often containing from 60 to 70 per cent of nickel.

In automotive manufacturing considerable nickel is used in heat resisting alloys which must withstand high temperatures, such as pyrometer thermo-couples, carburizing boxes, cyanide pots, etc. There is a large variety of these alloys on the market, the majority of which contain nickel in percentages of from 25 to 80 per cent.

The automotive industry is a large consumer also of die blocks and hammer piston rods in which steels containing nickel and resulting in considerable longer life and in cheaper production costs are employed.

EDITORIAL

Engineering Trends

THE summer meeting of the Society of Automotive Engineers is being held this week. Study of the program and analysis of the papers presented in the early sessions indicate that the engineers are thinking more seriously about improving present designs and methods than of striking out into radically new fields of construction.

They are exchanging information on the latest investigations and studies of problems which have been before them for several years and concerning which slow but steady improvement is being recorded. Gas-electric drives have, of course, come into the picture prominently for the first time in a good many years, but most of the other subjects such as noise investigation, oil dilution, brake design and transmission developments are familiar topics to those who have been to S. A. E. gatherings recently.

But most progress is the result of careful, steady investigation, rather than of sudden inspiration. So the automotive engineers seem pretty definitely to be on the right track.

Better Registration

RECENT investigation has shown that in many States automobile registration is so inefficiently carried on that actual new car registrations fall far short of actual new car sales, and not only do the States lose from 10 to 40 per cent of the income that they ought to receive from this source, but their total car ownership figures are considerably below the actual number of owners within their various State boundaries.

As a result of this investigation a very determined effort is being made to bring about better registration laws in many States, so that registration figures shall be accurate, and the money that these States should receive from car owners shall be available for highway purposes, etc.

New Mexico has shown what may be accomplished along this line. Up to this year there was such a large discrepancy between the cars registered and the cars actually operated that the Secretary of State started a quiet investigation. He enlisted the aid of leading automobile dealers throughout the State, and they furnished him a list of cars actually sold. This list he compared with registrations of each make, and as a result drafted a law that went into effect Jan. 1 this year, that brings to his office each week records of new car sales by all dealers. Checking these against registrations enables the State to collect practically all registration fees it is entitled to, and as a result that State is getting thousands of dollars that have been lost in the past.

Dealers, too, are now enabled to get accurate new car registration statistics to help them in the conduct of their business, and their State is getting credit for its full number of cars in operation, which it never had before.

Accurate registration statistics are very necessary to the dealer and the manufacturer in planning business operations, and it is to the dealer's best interest that the laws in his State covering this very important factor are brought up to the highest state of efficiency.

The situation in most States could be improved materially with very little effort once a better system was worked out and adopted. It isn't a difficult matter tc find the system; the hardest part of the job is selling it to the legislature. This can be done only by organized movement, as politicians rarely recognize anything that isn't organized.

Handling Men

BECAUSE study of men involves so many variables it is difficult to get most industrial managers to believe that human relationships in industry can or should be handled with the same scientific attitude of mind that is brought to bear on other production problems. Sociological, religious and political thinking is a catch-as-catch-can matter with most men. An executive who would readily admit his inability to design an engine because he never had studied technical design carefully or thoroughly often sets out to manage thousands of men without ever doubting his ability to do so.

As a matter of fact, of course, handling men is a whole lot more complicated than is engine design. Less authoritative data is available upon which to base judgments and under the best conditions the number of variables is much greater. Consequently the need for careful study of human psychology and personal desires is very great. Even with such study as a groundwork, plenty of complex problems will arise, solution to which will be difficult.

Engineers are often criticized for letting their personal ideas influence their design work too much; they are accused of designing for themselves instead of for the customers. How much more does personal attitude on the part of executives influence the course of industrial relations within a factory?

Few men can really qualify as experts in industrial relations. Some think they are so qualified simply by virtue of having attained a position of authority, when in reality attainment of such a position merely lays upon them the obligation to analyze the subject and to attempt to become expert. It is to be hoped that this subject of handling men will some day gain the recognition it deserves.

Our Industry Today

Talk Develops Regarding Price Reductions Now That Peak of Spring Production Has Passed —Some Factories Continue Full Speed

NEW YORK, June 17—With the peak of spring production passed, talk of price reductions in passenger car lines has developed in some parts of the automobile industry. Hupmobile, Willys-Overland, Hudson and Apperson all have made cuts on one or more models, but up to the present time no indications of general reductions are present.

It is pretty generally agreed in the trade that price reductions at the present time are likely only in an effort to secure competitive advantage, since there has been no basic change in wages, material prices nor production methods to warrant widespread price declines at this time.

While production for May was slightly behind the record-making April total, and while another decrease in output is expected in June, some companies still are going along at full speed and report sales equal to production. But readjustment of schedules to meet the usual seasonal sales drop is going on in most factories.

Profits Satisfactory

Profits so far this year have been highly satisfactory for most automobile companies. A number of concerns already have earned a full year's dividend and others have come close to that mark. This would indicate that earnings by the end of this year will show marked improvement over 1924, when on a total capital invested a group of eight representative companies earned slightly over 12 per cent, as compared with about 7 per cent earned by a group of representative steel companies and with 4.4 per cent earned by a representative group of railroads.

New models have been coming through steadily for the last three weeks, and five or six additional announcements are scheduled for the next fortnight.

Talk among body designers indicates a belief that sporty lines and lively colors, which characterized last year's models, will be continued in the new crop of cars, but that more attention will be given to comfort features, which have been neglected in certain instances in the effort to get a low construction with stream lines.

FORD CO. WOULD ENJOIN I. C. C.

COVINGTON, KY., June 17—The Ford Motor Co. is seeking an injunction in the United States Court here to prevent the Interstate Commerce Commission from distributing the company's privately owned railroad cars. The company contends that its cars should have been given to the Ford mines in Harlan County, Ky. The Interstate Commerce Commission holds that such distribution as that suggested by the company would result in a distinct disadvantage to the company's small competitors.

Little Action Shown This Week in Stocks

Slight Activity in Pierce-Arrow, Maxwell and Moon—No Definite Trend

NEW YORK, June 17—We have come to that season of the year when finance, commerce and industry are wont to slacken. The forces operative in the spring activity are spent. Those which are to be effective in the fall are not clearly discernible. Hence the general tendency to withdraw for a time, survey conditions and await developments.

This has been clearly evident in the securities markets of the week. Activity has dwindled until a scant 1,000,000 shares, the smallest turnover for a full five hours' session on the New York Stock Exchange in many weeks, was recorded Wednesday. Needless to say, such price fluctuations as have occurred have been meaningless.

Little Change in Metals

The iron and steel reviews of the week indicate little change in the recent trend of those industries. Further price concessions on sheets and cold rolled strip for third quarter delivery to automobile manufacturers; curtailment of operations by the two leading interests with decreasing demand for both pig iron and finished steel products, summarizes conditions. The money markets have been inactive despite the Treasury operations of the mid-month, which have come to be largely a matter of bookkeeping, without importance for the Street.

Among the automotive stocks interest at the end of the week centered in the Pierce-Arrow issues. An advance of more than 20 points in the prior preferred and of approximately five points each in the preferred and common stocks in one day, was accompanied by reports that the prior preferred stock is to be retired. The prior preferred, of which there is only 15,750 shares outstanding, is convertible into common stock on the basis of five shares of the latter for each share of the former. After paying the $8 dividend on the prior preferred stock last year the balance was equal to $6.25 on the 8 per cent preferred stock. In the first quarter of this year, after allowing for the pro rata dividend on the prior preferred, $1.69 was shown for the preferred upon which $34 of dividends have accrued.

Moon Motors Advances

Earlier in the week Moon Motors was an active feature, advancing to new high levels for the year on reports of large advance orders for the new Diana car which the company is bringing out. A sharp recovery in Maxwell Motors B on buying by previous sellers for the decline and the restless activities of professional traders seeking nimble profits accounts for the pointless fluctuations elsewhere in this group. A weak feature was Jordan Motors, which declined to new low levels without adequate explanation. In none of the tire or accessory stocks was there a movement of consequence. The retirement of A. L. Scheuer of the Kelly-Springfield Tire Co. had long been expected. The announcement was without effect market-wise.

The listless movement in the automotive stocks was duplicated by the rest of the list. Irregularity without definite trend summarizes the market of the week in all departments.—H. H. S.

New Capital for Rollin Motor Car Co. Planned

CLEVELAND, June 18—New capital is to be provided for the Rollin Motor Car Co. Grover Higgins of Tolles, Hogsett, Ginn & Morley, lawyers, says plans for strengthening the company have been discussed by a committee of creditors and officers. The company always has been undercapitalized, he says. At the company's suggestion David Johnson, attorney, was asked to serve as chairman of a creditor's committee. The company is operating and plans to continue to do so.

The Rollin Motors Co. was organized in January, 1924, with 100,000 shares of no par common stock. About $1,000,000 worth of stock was sold, practically all to friends and associates of Rollin White, chairman of the board, who designed the motor. James G. Heaslet is president, and C. D. Fleming secretary and treasurer.

Sales are reported to have increased gradually, and the factory was in operation this week, although production had been reduced considerably during the weeks past.

STUDEBAKER DROPS YEARLY MODEL PLAN

SOUTH BEND, IND., June 18—Announcement is made today by the Studebaker Corp. of America of the discontinuance of the yearly model policy. Effective immediately, changes and improvements will be made without regard to the calendar.

"Studebaker herewith announces the discontinuance of the custom of presenting a new line of automobiles each year," the announcement says. "Instead of bringing Studebaker cars dramatically up to date once in twelve months, we shall keep them up to date all the time with every improvement and refinement made available by our great engineering and manufacturing resources. This policy not only directly benefits present Studebaker owners, but also enables purchasers of new cars to obtain models that are always modern without the necessity of waiting for annual changes and without the danger of their new cars becoming obsolete."

600,000 "Orphan" Cars in Country, Says Vane

ST. LOUIS, June 16—More than 600,000 "orphan" automobiles are owned in the United States, according to C. A. Vane, general manager of the National Automobile Dealers Association, who described an "orphan" car as one whose manufacturer has gone out of business. Mr. Vane says the buyer of a new car "cannot be too careful in demanding evidences of the financial stability of the company producing the automobile he contemplates owning."

Results of a survey recently completed by the Association show, Mr. Vane says, "the necessity of the buyer looking far beyond the car right under his eyes when he is in the market." He points out that 40 per cent of the farmers who own cars above the Ford, Chevrolet, Overland and Star price class own "orphan" cars, and he adds that most of the "orphans" were sold with an inflated price list or a trading allowance to catch buyers seeking for the best trade-in allowance.

McCORD RADIATOR CHANGES

DETROIT, June 17—Malcolm McCormick, sales manager of the replacement parts department of McCord Radiator & Manufacturing Co., has resigned, effective July 1, and his duties will be assumed by P. L. Barter, vice-president in charge of sales, who, heretofore, has had general supervision. The remaining personnel of the department remains unchanged, W. G. Hancock being assistant sales manager; Joseph Holle, eastern sales manager, New York, and Edwin O. Bodkin, advertising manager.

Horning's Address Features Opening of S.A.E. Meeting

President Says Engineers Must Consider Commercial Side—Commends Tetraethyl Inventors—Kettering Talks on Safety

WHITE SULPHUR SPRINGS, June 18—The engineer must understand and give attention to the commercial side of technical activities if he is to be a success today, President Harry L. Horning told the members of the Society of Automotive Engineers who are gathered here for their summer meeting, which opened June 16 and will last to the 19.

Ernest M. Howe, newly elected president of the Gray Motor Corp.

President Horning's address was the feature of the first day's activities, which concluded with the semi-annual business meeting and a technical session on noise investigation. Mr. Horning voiced an earnest desire that the coming investigation of tetra-ethyl lead will be a fair one, free from political bias or influence. He commended the inventors of this product for having completed an important scientific work and expressed the hope that it will be found possible to use it with safety.

Nearly 800 Attend

Nearly 800 members and guests are attending the meeting, which is one of the largest the society has ever held. The sporting events were delayed by rain both Tuesday and Wednesday, but some progress has been made nevertheless. Scores for the qualifying round of the golf tournament show that the first flight consists of men who played under 90.

The nominating committee, composed of representatives from each of the sections, had added to it as delegates-at-large Fred Duesenberg, F. E. Watts and L. L. Williams. The committee is at work choosing nominees, but it is not expected that its task will be completed before Friday evening. While no advance information of its action is available, it is understood that the custom of having a president one year from the East and the next from the West, which usually has been adhered to, may be broken this year.

Kettering Talks on Safety

Charles F. Kettering, president, General Motors Research Corp., furnished the chief talk at the Wednesday evening session, when he discussed "Automobile Design and Construction Features as Elements in Highway Safety." Mr. Kettering said that safety would be improved and speeding decreased materially if all policemen wore uniforms, so that they could be detected at a long distance. Thus they would keep people from breaking the law instead of simply catching and punishing them after the law has been broken. He cited better brakes, steering gears, bumpers and every other feature of construction as the automotive engineers' contribution to

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MAKE USED CAR COUNT

INDIANAPOLIS, June 17—The Indianapolis Automobile Trade Association, under the management of John B. Orman, has under way a complete count and survey of the total used car stocks in the hands of all dealers. Last year this used car census was taken with the total number of cars only in mind, but this time Mr. Orman will check not only the total stocks on hand but he will list the number and makes and type of such cars in the possession of each dealer. He hopes to maintain a continuous check on used vehicles if the members of the association and other dealers will cooperate in the compilation of such data each month.

MACK BUYS MOSSBERG CO.

BOSTON, June 17—Edward Mack, Jr., of Boston bought at foreclosure sale at Attleboro the Frank Mossberg Co., makers of machine tools, supplying the automotive industry. Mr. Mack represented a purchasing committee of bondholders. There will be a complete reorganization of the firm, and there is no prospect that the plant will shut down. During the receivership from Jan. 12 to May 31, net operating profit was $30,237.08, and the company has six weeks' unfilled orders.

Urge Closer Tie Between Advertising and Sales

South Bend Convention Calls Lack of Coordination by These Departments Weakest Link in Merchandising Chain

SOUTH BEND, June 12—The weakest point in automotive advertising is lack of thorough cooperation, in the case of many advertisers, between the advertising and sales departments, in the opinion of advertising men in the industry, who held a convention June 11 and 12 at South Bend. Some car and truck advertising is not properly merchandised to car and truck dealers and some parts and accessory advertising is not made a part of the selling efforts of jobbers and dealers, according to speakers at the convention, with the result that returns on advertising expenditures are sometimes inadequate.

The advertising men declared that one of the chief duties of an advertising department should be to tie up its advertising with the selling activities of its wholesalers and retailers and salesmen of these organizations. Some examples were cited of effective cooperation along these lines.

Erskine Host at Luncheon

The convention was attended by approximately sixty advertising managers from manufacturing companies in the National Automobile Chamber of Commerce and the Motor and Accessory Manufacturers' Association, which jointly arranged the meeting. There were a number of guests from allied industries. Meetings were held at the Chain o'Lakes Country Club, a few miles outside of South Bend, where A. R. Erskine, president of the Studebaker Corp. of America, entertained the party at a luncheon the second day. Mr. Erskine and the new Studebaker sales manager, Paul G. Hoffman, formerly Studebaker distributor at Los Angeles, spoke at the luncheon.

The N. A. A. C. and the M. & A. M. A. sections of the conferences met separately the first day, with Edward S. Jordan, president of the Jordan Motor Car Co., presiding over the former and Ezra W. Clark, advertising manager of the Clark Equipment Co., over the latter. The two sections lunched together, when Mr. Jordan talked on the necessity for facts and common sense as a basis for advertising and selling; and H. H. Rice, vice-president of the General Motors Corporation, spoke, urging all divisions of the industry to support the movement inaugurated by the national associations to bring about elimination by the coming Congress of the wartime excise tax on passenger cars, trucks, parts and accessories. Mr. Rice declared that further emergency taxation of the automotive industry was unjustified, as the emergency had passed and the tax was an unfair burden on transportation. He urged the individuals present to write to their Senators and representatives in Congress or talk to them, strongly advocating repeal of all special automotive levies.

In the golf matches following the sessions prizes were won by W. F. Lochridge of the Bassick Manufacturing Co., W. K. Towers of the Paige-Detroit Motor Car Co. and Harry Tipper of the *Chilton Class Journal Co.*

The speakers generally advocated use of business papers read by motor vehicle manufacturers for original equipment advertising, and several also strongly supported advertising in wholesalers' and retailers' trade papers and to some extent by mail to obtain and hold the good will of motor vehicle merchants. There was general agreement with the statement that while the original equipment manufacturer may get business exclusively by direct selling effort, he needed the indirect sales force of advertising to hold it.

Speakers on original equipment advertising included L. R. Babcock of the Zenith-Detroit Corp. Ezra W. Clark of the Clark Equipment Co., J. L. Wiereng of the Piston Ring Co. and H. H. Buggie of the Dura Co.

Discuss Advertising Cost

The joint session of the N. A. C. C. and the M. A. M. A. representatives was opened with a round table on keeping advertising costs down, led by O. R. McDonald of the American Chain Co. and W. F. Lochridge of the Bassick Manufacturing Co. Other speakers included Paul R. Bromfield of the Fisk Tire Co., A. J. Zealley of the Federal Rubber Co., W. M. Baldwin of the Pierce-Arrow Motor Car Co. and Frank E. Borer of the Garford Truck Co. The discussion had to do mostly with parts and accessory advertising.

It was declared that preparing advertising for a piece of promotion copy was merely the beginning of the advertising department's job if it was properly conducted. The chief undertaking from the result-getting standpoint was to get jobbers and dealers to tie up with advertising in trade papers and some of the magazines and to use window displays, mailing pieces and other promotion matter. It was shown

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NEW CHRYSLER FOUR SUCCEEDS MAXWELL

DETROIT, June 16—The Chrysler Four is now in production at the plant of the Chrysler Motor Corp., succeeding the Maxwell, which has been discontinued. The new car resembles the Chrysler Six in appearance and is understood to have many of its characteristics.

A description of this new line of four-cylinder cars will appear in *Automotive Industries* of June 25.

Truck Export Field Evenly Distributed

Survey Shows No One Market Predominates Demand for Product

WASHINGTON, June 17—Truck exports from the United States to the 15 leading markets by division into continental groups reveals a growing tendency toward a more equal distribution, it is announced here by the automotive division of the Department of Commerce. This trend was especially marked in 1924, when no one continental group of market leaders accounted for more than 21.7 per cent of the total truck exports.

Absence of market concentration in 1924, it particularly brought out, says the automotive division, when it is seen that Japan, the leading individual truck market for that year, accounted for no more than 3053 trucks out of a total of 27,361 exported to all markets, or approximately 11 per cent. This ratio contrasts greatly with Canada's share of the total trade in 1913, when this country was predominantly the largest individual market to the extent of 49.3 per cent, or with Belgium in 1922, when our exports to it represented practically one-fourth of the total shipments of trucks.

Marketing policies which result in a comparatively equal volume of sales being effected in the various continental groups, observes the automotive division, cannot help but augur well for American truck exporters because, if maintained, no great loss would follow should any one important continental market fail to keep pace with the others.

CHANGE SPRING FIRM

HAMBURG, N. Y., June 17—The F. R. Atkinson Spring Co., Inc., has been rechartered to succeed the Burdick-Atkinson Corp., F. R. Atkinson having purchased the interests of the other holders in the concern. The company will continue to manufacture springs for automobile upholstery, specializing in the genuine lace construction.

Dutch Rubber Aid Is Sought in Crisis

Association Also Plans Fewer Tire Sizes and Elimination of Second Quality

AKRON, OHIO, June 17—First steps were taken here this week by the Rubber Association of America, Inc., to break the British "monopoly" on crude rubber which has boosted the price from seventeen cents to a peak of seventy-eight cents a pound in one year.

A committee was appointed by the board of directors, representing all the leading rubber companies on this continent, to enlist the aid of the Netherlands and its rubber planters in the Far East.

American capital is to be invested in rubber growing in Dutch possessions, on which there is no restriction. With American help it is believed the Dutch production can be increased to supply the needs of American rubber manufacturers.

Dutch planters now produce approximately 40 per cent of the world's rubber supply. American rubber factories use 80 per cent of the world's crude rubber production.

Definite Policy Outlined

This statement by F. A. Seiberling, president of the Seiberling Rubber Co., and approved by the association directors, explains the attitude of the American manufacturers:

"A careful survey of the industry's situation indicated that vigorous action along the line of conservation practices can be taken without adversely affecting service to the public.

"Definite action was taken looking to the reduction of excessive inventories now being carried by manufacturers and dealers:

"First, by substantial reduction in the number of types and sizes of tires, footwear and mechanical goods.

"Second, by the abandonment of all interchangeable balloon tire sizes.

"Third, the elimination of all second quality lines of tires.

"Fourth, postponing for five months the solicitation of orders for spring dating, no shipments on such orders to be made before 1926.

"The art of reclaiming rubber having been greatly advanced through improvement in quality, permitting its wider use, and as additional capacity in excess of 2,000,000 lb. monthly will be available within the next sixty days, and as plans for large further extensions are under way, it is believed that the present distressing situation will shortly be relieved.

"A committe was appointed to confer with the Dutch Government with the end in view of arranging satisfactory terms for the investment of American capital in growing of rubber in Dutch possessions."

The conservation program adopted by the association is designed not only to relieve the apparent rubber shortage, but also to aid the industry in solving the problem of the multiplicity of automobile tire sizes and types, regarded as annoying and expensive to manufacturers and dealers. To keep all these sizes in stock necessitates the carrying of excessive inventories.

There are now approximately forty different types and sizes of tires. The proposed plan will reduce these to about fifteen. With the abandonment of interchangeable balloon tires, future balloon

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Trend of Closed Cars Shown in G. M. Figures

NEW YORK, June 17—In May 59 per cent of all cars sold by General Motors were closed cars, compared with 41 per cent in May, 1924, 38 per cent in 1923 and 19 per cent in 1922. The percentages by months for the past three years follow:

	1925 Per Cent	1924 Per Cent	1923 Per Cent	1922 Per Cent
January	47	42	34	29
February	54	38	35	29
March	60	38	36	25
April	61	42	40	22
May	59	41	38	19
June	..	37	35	26
July	..	37	31	26
August	..	40	36	31
September	..	42	35	37
October	..	52	38	24
November	..	71	42	30
December	..	67	44	39
Per cent for the year		43	37	28

This comparison includes Chevrolet, Oldsmobile, Oakland, Buick and Cadillac.

Short Week Explained by Ford Co. of Canada

WINDSOR, ONT., June 15—Following its policy to regulate production so that continuous employment may be given to all employees as far as possible, the Ford Motor Co. of Canada, Ltd., has returned to a five day per week schedule. Since the men are working eight and three-quarter hours per day, they are actually working a five and one-half day week in a five-day period.

Wallace R. Campbell, vice-president and treasurer, points out that it has always been the policy of the company to shorten working periods rather than lay off a considerable number of employees.

CHANSLOR AND LYON CHANGES

PORTLAND, ORE., June 17—Chanslor and Lyon Co., Pacific Coast automotive jobber and manufacturer of C. & L. tires, has reorganized its tire business, the manufacturing end of which will now be known as the C. & L. Tire and Rubber Co., according to F. C. Carlson, manager of the company's Portland wholesale branch. E. T. Nedbal is president and comptroller-treasurer and H. Senn is secretary and general tire sales manager.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, June 17—The substantial improvement in retail and jobbing trade in the first half of June as compared with the early part of May is attributed to a more rapid movement of seasonal goods. While many lines of production regularly reduce their activity in the summer months, the predominance of steadying influence in general is still apparent.

Retail sales of 523 stores in May, as reported to Federal Reserve banks, slightly exceeded the figure for May, 1924. Sales of two leading mail-order stores were 7.7 per cent larger than a year earlier, with ten chain-store systems showing a corresponding increase of 10.4 per cent.

The official forecast of the wheat crop, based on condition as of June 1, is for a yield of 661,000,000 bu., as compared with 873,000,000 bu. harvested last year. Notwithstanding the impairment of condition during May, wheat futures have declined recently, apparently in response to reports of favorable prospects in other producing countries.

The value represented by building contracts awarded in 36 states in May, as reported by the F. W. Dodge Corp., marked a decline of 9 per cent from the record figure in April, but was 18 per cent above that for May, 1924.

The decline last month of 396,768 tons in the forward orders reported by the United States Steel Corp. was slightly less than the reduction reported for April.

Exports from the United States in May were valued at $370,000,000, or $29,000,000 less than the April figure. Imports, valued at $328,000,000, were $21,000,000 less than in April. Both branches of the trade exceeded the figures for May of last year.

The average daily output of crude petroleum in the week ended June 6 was 2,329,350 barrels, or 17,550 barrels less than the record figured reported for the preceding week.

Revenue freight loadings during the week ended June 6 numbered 994,874 cars, again establishing a new record for 1925. This total, however, was 17,438 cars less than the loadings in the corresponding week last year.

Commodity price averages declined slightly last week. Professor Fisher's index of prices at wholesale was 156.9, as compared with 157.2 the week before.

Bank debits to individual accounts in leading cities in the week ended June 10, as reported to the Federal Reserve Board, were 14.3 per cent larger than the total for the corresponding week in 1924.

N.A.C.C. Move Renews Action on Insurance

Plans for Cooperative Company Mark Culmination of Long Controversy

NEW YORK, June 17—The decision of the directors of the National Automobile Chamber of Commerce to consider plans for a cooperative insurance company to bring down automobile coverage rates marks the culmination of a long-standing controversy between the manufacturers and the underwriters.

For the last 15 years the automobile producers have been dissatisfied with the existing insurance conditions. In 1914 a movement similar to the present one was launched, and the Manufacturers & Dealers Motor Underwiters, Inc., was organized with two independent insurance companies participating. Internal disagreements brought the enterprise to an early end, but the manufacturers have kept the idea in mind to be brought out again at the opportune moment.

Theft Rates Increased

Several recent actions of the underwriters, it is learned, led to the revival of the project by the N. A. C. C. Theft rates on closed cars have been advanced, and although the schedules on open cars were lowered at the same time, the manufacturers feel that the insurance burden has been considerably increased, in view of the large proportion of closed cars in current production.

Of late, also, wide differentials in rates have appeared, so that in some instances the costs of insuring a car in a particular price class are double those of another in the same class. Lastly, a notice from the underwriters, sent out June 2, has been interpreted as indicating that about this time next year all cars must bear coincidental looks in order to carry the most favorable insurance rates. This device automatically looks with the turning off of the ignition switch, and the change from the present type would be a costly one.

Popularity No Factor

How the differentials operate can be shown by some of the rates in force in the New York territory. Rates vary in other parts of the country, but the differentials are the same. On two cars in the $1,000 class rates per $100 of selling price are as follows:

	Fire	Theft
Car A	$.35	$1.65
Car B	.95	2.95

Popularity of the cars is evidently not a factor here, as Car A sales are several times those of Car B. Much the same situation is shown with the following cars in the $1,500 class:

	Fire	Theft
Car A	$.35	$.95
Car B	.35	1.65
Car C	.50	2.40

Here, again, the least popular car, judged by sales, bears the lowest rate. Rates on two cars selling at about $2,500 are as follows:

	Fire	Theft
Car A	$.25	$.95
Car B	.35	2.40

An effort to obtain the underwriters' side of the controversy developed some interesting views. It was held that the popularity of certain cars with bootleggers has led to an unusual number of thefts of these vehicles and consequently to an advance in the rates. What the rum runner particularly looks for in a car are roomy tonneau space, quick getaway and high speed. All the car rates, it was said, are based on experience tables and represent the lowest that can be quoted if the insurance companies are to continue in business.

Closed car rates, said the underwriters' spokesmen, were advanced because thieves are finding these models the easiest to dispose of. The lock question, they added had been agitated for five years, and despite their conviction that the coincidental lock is the best type, its adoption had been deferred again and again in deference to the manufacturers.

Underwriters' Grievances

It was revealed that the underwriters have grievances of their own. Frequent price reductions, made abruptly and without warning, have created a moral hazard, they say, since a purchaser frequently finds himself with a car bought at $1,500, for example, and insured accordingly, and now listed at $1,250. If such a car can be "stolen" the assured may make $250 profit.

Considerable skepticism was expressed with regard to the manufacturers' project.

"They are welcome to the effort," said one underwriter. "The insurance market is free and open. There is a great deal of competition, and no companies could make large profits for very long. The commercial records are strewn with the wrecks of underwriting companies, and if the automobile manufacturers think they can succeed where others have failed, let them by all means make the attempt."

OLDS SALES INCREASE

LANSING, June 17—May sales of Oldsmobiles were 36 per cent greater than for May, 1924, figures released by D. S. Eddins, general sales manager, show. This is the third consecutive month that Oldsmobile sales have shown a substantial increase over those for the same periods of 1924. Advance orders received by Olds dealers and distributors enabled the factory to enter June with the assurance that capacity production throughout the entire month will be maintained.

According to Mr. Eddins, the northwestern section of the country from the western shore of Lake Michigan to the Pacific Coast is showing remarkable prosperity, judging from the reports and orders received by distributors and dealers in that section.

Plans Plane to Make 400 Miles Per Hour

German Expert Says Designing and Production Will Put America in Lead

NEW YORK, June 17—Declaring that America is behind Europe in aviation development, Dr. Otto A. Koller, German aeronautical expert now in New York, says that only proper designing and increased production are needed to make the United States a world leader in commercial flying.

Dr. Koller is planning the construction of a plane which he intends to enter in the next Pulitzer air races, which will be capable of speed of 400 miles per hour. He expects to shatter the existing American record of 266 miles an hour, held by Lieut. A. J. Williams, Jr., of the Army Air Service. He will enter two machines in the race, "both of which," he said, "will be small biplanes of the pursuit type, with specially shaped wings of my own design, to provide the least possible air resistance. They will be built in accordance with plans and specifications I drew last year while making tests for the German government in conjunction with the University of Gottingen.

Builds Commercial Planes

One will be of 520 horsepower, capable of making more than 300 miles an hour, and the other with which I expect to break Lieutenant Williams' record by fully 100 miles an hour, will be equipped with an 800 horsepower motor."

He is at present building a small fleet of commercial planes at his factory in Hallem, Pa., in which, he says, will be embodied two important inventions and improvements. The first is the equipping of each plane with two motors, one being held in reserve and brought into service when needed by the pilot's merely pressing a button. The second improvement, Mr. Koller said, will enable commercial planes with room for from 12 to 24 passengers to rise and land with ease from the roof of a large New York hotel.

He is a graduate of the University of Gottingen and has served as consultant to the Zeppelin works at Friedrichshafen, the Pfalz works at Speyer, the Schuette-Lanz works at Mannheim and the Albatross works at Adlershof. During the war he was chief engineer and designer for the division of aeronautics of the Imperial German Government.

CLAINGAN ELECTED PRESIDENT

TOLEDO, June 17—Robert E. Claingan has been elected president of the Bock Bearing Co. by the board of directors. W. S. Quinlan is vice-president and C. G. Steinbicker is secretary and treasurer.

Plans to increase factory production 50 per cent were approved by the directors, resulting, it is stated, from the foreign business now well established.

Studebaker Launches New Trade-in Policy

Dealers Will Pledge Themselves to Responsibility on All Used Cars

SOUTH BEND, IND., June 16—Offering the dealer an opportunity to put the name and integrity of the factory behind his used car business, Studebaker has launched a plan through which it hopes to score a long step toward stabilization of the resale trade of its many field representatives. Executives of the Studebaker corporation believe that in this new attack on the used car problem they have hit upon a measure which will tend to materially build up public confidence in Studebaker resale values and at the same time minimize the proportions of one of the biggest merchandising problems in the trade.

Responsibility on Dealer

In addition to putting the name of Studebaker back of assurances of honest values and square dealing, a vital element of the plan imposes a similar responsibility upon the dealer. The good name of his house must be placed behind all used cars offered for sale, the public having his solemn assurances that all used cars offered the market by him are honestly represented.

To avail himself of the corporation's cooperation in the plan the dealer must execute and live up to the following standard pledge:

1. All used cars offered to the public shall be honestly represented.
2. All Studebaker automobiles which are sold at certified cars have been properly reconditioned, and carry a 30-day guarantee for replacement of defective parts and free service on adjustments.
3. Every used car is conspicuously marked with its price in plain figures, and that price, just as the price of new cars, is rigidly maintained.
4. Every purchaser of a used car may drive it for five days, and then if not satisfied for any reason, turn it back and apply the money paid, as a credit on the purchase of any other car in stock, new or used.

Not only to the public, but also to the Studebaker Corporation of America, whose cars we sell, we pledge adherence to the above policy in selling used cars.

Will Check Dealers

The foregoing pledge is not only to be signed and delivered by the dealer to the Studebaker Corporation of America, but under the conditions specified, it must be displayed conspicuously in the dealer's store. It is announced that the dealer will be frequently checked up by field men to see that the pledge is properly maintained.

To the dealer, Studebaker points out, this arrangement means future dealing in definite merchandise on a fixed and unchanging price basis and the end of dickering and jockeying on sale prices, as well as establishment of a repute in the community as a dependable merchant "because the goods he sells are backed up like any other dependable merchandise."

It is announced that the Studebaker corporation will support the new policy by advertising it nationally and also by advertising in the dealers' territory.

Ford Warns Business to Beware Anti-Trust Law

DETROIT, June 17—Henry Ford warns "Big Business" to beware of the Sherman Anti-Trust law. He believes the Coolidge Administration is ready to check any tendency toward renewal of trade combinations that were in vogue before that law was enacted.

In his Dearborn Independent, Mr. Ford notes that certain students of public affairs say that recent Supreme Court decisions practically abolish some provisions of the Sherman law. Even if this were so, he asks whether it would justify business "in going back to the abuses which brought the Sherman law into being?"

"Are we," he asks further, "to be so wise in our service as the law compels us to be? If that is the program to be adopted by business men, it will certainly result in the next law being ten times stronger and not quite so easy to nullify."

S. A. E. Summer Meet

(*Continued from page* 1077)

safety. Dr. H. C. Dickinson proposed that speed laws be replaced by a simple law that read, "No vehicle shall be driven at a speed greater than that at which the driver can stop it within the assured clear course ahead."

At the first technical session on Tuesday evening, H. C. Snook of the American Telephone and Telegraph Co. demonstrated instruments for measuring noise which his organization has developed.

White Sees Progress in Truck Operation

Says Railroad Adoption of Motor Lines Is Next Step in System

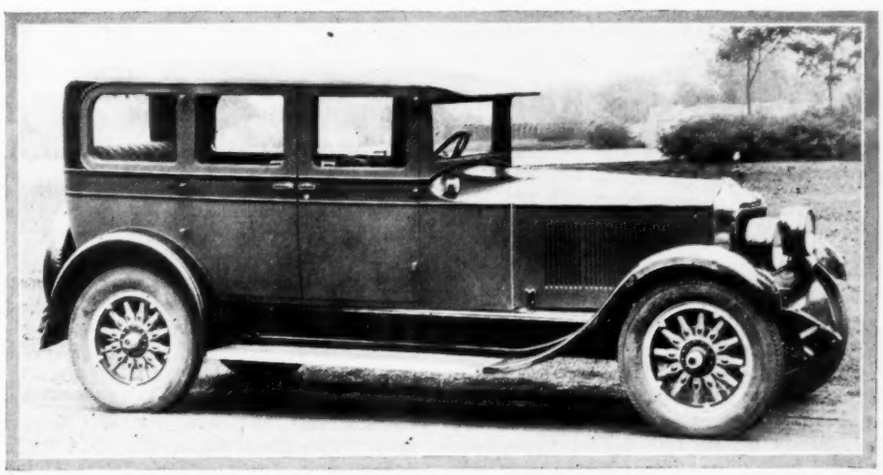
NEW ORLEANS, June 16—Entrance of the railroads into the operation of motor truck and bus lines, unifying transportation into an elastic system to better serve the needs of the country, is the next logical development in more efficient freight and passenger handling, according to Walter C. White, president of the White Co., Cleveland, who was in New Orleans recently to award the trophies to the New Orleans office and the Atlanta branch of the White company, won in the recent truck selling contest.

"The motor car and the bus would not exist today in anything like the quantity they do unless there was a public demand for them," Mr. White said. "Still we believe we are merely at the beginning."

"I believe the electric railroads have, through their experience in marketing transportation, placed themselves in position to be the logical operators of motor buses, supplementing their present service. It is important that the steam and the electric roads should enter the field of motor transportation and fit it in with their present program in order to offer the kind of service the public requires.

"We in the truck manufacturing business are strongly of the opinion that a readjustment will have to come. It is an economic necessity. The railroads are built upon a long haul basis. As I understand it, the use of light, short-haul equipment is not practicable. The roads will come to the point where they will understand how to fit motor transportation into this sort of case."

New Diana Straight Eight



This is one of the six models now on exhibit. The touring car lists at $1,895 *and the sedan, pictured here, at* $1,995

Angell Describes Sleeve Valve Motors

Continental Motors Head Tells of Tests Being Made by European Concerns

DETROIT, June 16.—W. R. Angell, executive vice-president of the Continental Motors Corp., states, upon his return from a ten weeks' trip throughout Europe, that considerable attention is being devoted by foreign engineers to the development of a single sleeve type of automobile engine.

The Burt-McCallum or Argyle engine, according to Mr. Angell, is the result of several years' research and experimental work and is being tried out by such concerns as Mercedes, Fiat, Daimler, Citroen and several others, apparently giving better satisfaction than the present type of internal combustion engine. It is said to develop much greater speed and to operate with less noise.

Mr. Angell believes an engine of this kind will be the ultimate solution of the problem of obtaining greater efficiency and economy.

"Foreign engineers claim many advantages for this particular sleeve-valve type of motor," he said. "The exceptionally big valve ports permit complete filling and scavenging of the cylinder without any of the lubrication difficulties attending some other types. Another feature in its favor, so they say, is the principle of fewer moving parts and the absence of adjustable mechanisms which are necessary in most of the present type motors.

"To the general public the absence of noise in the sleeve-valve type of motor is a distinct advantage. This is due to the fact that the valves are closed, as well as opened, positively. The half-speed shaft is driven by a silent chain instead of spur or helical gears. Absence of valve pockets and exposed gear members gives the motor a good appearance."

Asked what the Continental has in mind along this line, Mr. Angell said:

"We have been specialists in internal combustion engines for twenty-four years and are constantly experimenting with various types of engines, including the single sleeve type. It may be that something will be found to supplant the present type motor, but the poppet valve motor will be in use for many years to come."

NEW AIR SERVICE

DAYTON, June 16—Air passenger service between Dayton, Ohio, and Columbus, Ohio, has been announced by the Rinehart-Whelan Co. Both enclosed and open four-passenger ships, capable of speeds up to 120 m.p.h., have been placed in service. The time to negotiate the seventy-two miles between the two points is less than fifty minutes. A gradual extension of the line eastward and northward is planned. The planes used, with one exception, were designed and built by the Rinehart-Whelan Co. and are powered with Hispano-Suizo motors.

HALF MILLION IS GIVEN FOR AIRCRAFT SCHOOL

NEW YORK, June 15—To establish a School of Aeronautics in connection with its College of Engineering, Daniel Guggenheim has given $500,000 to New York University.

Mr. Guggenheim sees the necessity of developing engineers capable of making operation of aircraft as a business proposition comparable to operation of railroads, in order that America may attain "the place in the air to which her inventive genius entitles her."

Mr. Guggenheim speaks of the new field of employment and endeavor that aeronautical engineering opens to young men as an uncrowded profession, offering opportunities unmatched in possibilities, and adds that "the great future of aviation and aeronautics is in the promotion of the arts of peace rather than war."

Canada Seeks Limit in Bus Operation

WASHINGTON, June 17—Recommendation that the number of buses in Canada be limited has been made to the Canadian Government by J. L. Perron, Minister of Roads, according to the Automotive Division of the Department of Commerce. He asserts that buses are congesting traffic, endangering the lives of the public and deteriorating public highways. An unofficial warning has been issued, the dispatch continues, that those who buy buses from now on will do so at their own risk. It is possible the situation may develop into the issuance of a certain number of bus licenses annually.

Dodge Sales So Far This Year Make Records

DETROIT, June 12—Total sales of Dodge Bros. motor cars for the first five months of 1925 broke all records for corresponding months of previous years, according to official figures just released. Sales in the United States and Canada Jan. 1-June 1 increased 15.4 per cent and overseas sales 48.6 per cent over the same months last year.

Total sales, including United States, Canada and overseas, for the present year will exceed those for 1924 by 20 per cent, according to factory officials. They are expected to exceed those of 1923 by over 50 per cent.

FINANCIAL NOTES

Fisher Body Corp. and subsidiaries report earnings of $18,394,205 for the fiscal year ending April, 1925, after all expenses and reserves for depreciation, as compared with net earnings of $26,607,163 in the previous fiscal year.

Net income in the fiscal year just ended, $15,244,409, was equivalent to $6.08 a share earned on the 2,400,000 shares of $25 par value common of the parent company. Net income in the previous year equalled $35.73 a share on the 600,000 of common then outstanding, or the equivalent of $8.93 a share on the common now outstanding.

Packard Motor Car Co. earnings for the first half on the year, after all charges, amounted to nearly $3,000,000, or over $1 a share on the 2,377,020 shares of $10 par value common. Earnings of only a little more than $4,000,000 are needed in the second half to make the twelve months' total larger than the $7,081,879, or $2.39 a share earned in the 1923 fiscal year, which so far has been the largest in the company's history.

General Motors Corp. net profits for the second quarter of 1925 are expected to be nearly three times the net of $7,666,034 earned in the second quarter last year. With earnings in the first quarter this year equalling $3.08 per share on the 5,160,599 shares of common, earnings for the first half may approach the $7.37 per share reported for the entire year 1924.

Hudson Motor Car Co. earnings for the first half of this fiscal year are estimated at nearly $10,000,000. This would mean more than twice the company's dividend requirements at the rate of $3 a share annually. The best full year earnings previous to this year were slightly more than $8,000,000.

Gabriel Snubber Manufacturing Co. reports shipments for May totalling $492,838, as compared with shipments for May, 1924, of $254,196. Net earnings, after all charges and reserves, including Federal taxes for May, 1925, were $138,035.

Dunlop Tire and Rubber Corp. will call its entire first issue of first mortgage and collateral trust 7 per cent sinking fund gold bonds for retirement at 105 and interest. Notice of the redemption date, it is said, will be issued shortly.

Electric Autolite Co. has earned net sufficient to cover all dividend requirements for 1925 during the first half of the year. Regular quarterly $1.50 dividend is declared, payable July 1 to holders of record June 15.

Goodyear Tire and Rubber Co. directors, it is reported in Akron banking circles, are considering payment of back dividends of 29¾ per cent on the 7 per cent cumulative preferred stock.

FORD BRANCH KEPT OPEN

INDIANAPOLIS, June 16—The Indianapolis Ford branch and assembly plant will continue here until after the city election this fall. It has been understood that the plant would be closed because of adverse action by city officials in voting to open a street adjacent to the plant. It was reported that this plan would cost the Ford plant some $200,000 for rearrangement to conform with the proposed track elevation. It is now said that the new city officials may reconsider the plan.

Sheet Steel Market at Low Price Level

Competition Among Producers Causes Decline—Car Makers Buy As Needed

NEW YORK, June 17—Full-finished automobile sheets and cold-rolled strip steel are now selling at levels so low that it seems almost impossible for the market to dip any further. When body sheets declined to 4.25c., Ohio mill, the lowest price in eight years had been reached. Sales of cold-rolled strip steel at 3.50c., Pittsburgh, represent the low of the movement over nine years, although during the first quarter of 1922 sales were made at the same level.

Recent declines were not brought about by pressure on the part of automotive purchasers, but resulted solely from the keenest competition among producers ever witnessed in any department of the steel market. There is very little mystery as to costs of rolling and finishing sheets, and that prevailing levels are very close to cost, and in the case of some mills below cost, is obvious. Passenger motor car manufacturers continue to buy conformable to their own operating schedules, and it is doubtful whether any automotive consumer has taken advantage of the current market by anticipating any of his third quarter requirements.

Called "Horrible Example"

It is the absence of such commitments that makes for a continuance, for the present, of so attractive prices. With their order books showing at best a sufficient backlog for two weeks' operations, mill owners are obliged to scurry around for every possible order in sight, and this condition accounts to a large extent for the favorable position enjoyed just now by steel consumers. Non-integrated sheet rollers are striving hard to bring down the price of their raw material, sheet bars, and there are rumors that in some instances concessions of $2 a ton have been promised. Just how long this propitious state of affairs, from the automotive steel consumer's point of view, will continue is problematical. Significant is the fact that sales agents of steel mills, producing a varied line of steel products, refer to the sheet market as a "horrible example of demoralization," which portends that just as soon as steel conditions as a whole show the slightest improvement, pressure will be exerted to end the plasticity of sheet prices. In fact, this pressure has already set in. The smaller mills lead in making concessions, but quite frequently when they think they have an order cinched one of the large producers comes along, meets their price and takes the order away.

Pig Iron—Heavy sales in the mid-western markets are beginning to give way to somewhat more quiet conditions. The Pittsburgh market is still on an $18, valley, basis, but at more western market points slightly higher prices prevail. Automotive foundries appear to be well supplied for the time being.

Aluminum—Automotive demand for aluminum is said to have slightly eased off, but the market for primary metal remains pegged at the same level as heretofore. The absolute control of the aluminum sheet market by the domestic producer may be visualized from the fact that in ten months ended April 30, 1925, imports of plates, sheets, bars, etc., totaled 181,726 lb., as compared with the corresponding period of 1923-1924 when imports aggregated 625,071 lb. In April, 1925, imports of rolled aluminum amounted to 9964 lb., as compared with 38,158 lb. in April, 1924. The market for secondary metal is slightly easier.

Copper—Domestic consumers are showing better interest in offerings at around 13½c. Demand for automotive brasses, etc., is good.

Tin—Slightly more activity is in evidence, consumers buying on dips and ignoring the market when London works it higher.

Lead—Tension has considerably lessened and the market has turned quiet.

Hudson Reduces Price of Phaeton to $1,250

DETROIT, MICH., June 16—The Hudson Motor Co. has just announced a cut of $250 in the price of the seven-passenger Super Six phaeton, the new price being $1,250. This is the first price change in the phaeton model since March, 1924, this model being listed at $1,500 since that time, while four price changes were being made on the coach and several on other models.

The present reduction, the largest single cut made on any Hudson model for over a year, follows the cuts in the closed Hudson models, announced in April, and in the Essex models, announced later. The change brings the phaeton down to the same price as the coach, the lowest level yet reached for phaeton models.

STUDEBAKER ROADSTER CUT

SOUTH BEND, IND., June 15—The Studebaker special six Duplex roadster, in which a number of body changes were made in April, including the addition of a rumble seat, the price at that time being increased from $1,450 to $1,495, has been reduced, now selling at its former price of $1,450.

OVERLAND LAYS OFF 2500

TOLEDO, June 16—Employment is still 50 per cent better than it was a year ago in Toledo, but last week the Willys-Overland Co. laid off about 2500 men, due to shortening of some schedules, which have been at peak for several weeks. Other plants in the automotive industry are holding their own in production and working forces.

Will Move Maxwell's Service Department

Parts for Cars Built Before This Year to Be Made at Dayton

NEW CASTLE, IND., June 16—The service department of Maxwell Motor Corp. will be removed from this city to Dayton, Ohio, according to an announcement made by company officers, to make more room in the plant here for drop forge, transmission, screw machine and axle departments.

Considerable production will be done at Dayton in making of parts for Maxwell cars built previous to 1925. All parts will be supplied from the Dayton plant, which will do a business estimated at $5,000,000 to $6,000,000 annually.

About 50 heads of departments will move to Dayton, but 200 other employees will be secured there. Operations are expected to begin at Dayton about July 1, and the North Dayton property of the company will be utilized.

Neel-Cadillac Co. Now Becomes Factory Branch

PHILADELPHIA, June 15—The Neel-Cadillac Co., which since 1908 has distributed Cadillac cars in Philadelphia territory, has been purchased by the Cadillac Motor Car Co. of Detroit and will be operated as a factory branch under the management of Ralph W. Cook, who has been the active executive head of the Neel-Cadillac Co. for many years. Percy L. Neel, for whom the local company is named, is the pioneer automobile dealer of Philadelphia and one of the oldest and largest distributors of Cadillac cars in the country.

Announcement of the purchase was made by L. P. Fisher, president and general manager of the Cadillac Motor Car Co. of Detroit, who is here with Earl C. Howard, vice-president, and Lynn McNaughton, general sales manager.

OPEN CARS MORE NUMEROUS

CLEVELAND, June 16—Investigation by the Cleveland Automobile Manufacturers' and Dealers' Association shows that there are 118,950 open cars in Cuyahoga County. This is 65 per cent of all cars owned in the community, while the national proportion is estimated at 25 per cent closed models and 75 per cent open.

The association finds that the preponderance of open cars to be traded in presents an acute problem to dealers.

FRENCH PLANT FOR LONDON

LONDON, June 16—It is stated that a leading French light car manufacturer has decided to build a factory in London for supplying the British market direct instead of exporting from France, and to employ British labor.

Moon Displays New Diana Straight Eight

Touring Lists at $1,895—Sedan at $1,995—Use Special Continental Motor

NEW YORK, June 18—The new Diana Straight Eight which is being manufactured by the Moon Motor Car Co., and is to be marketed by the Diana Motors Co., was seen by the public for the first time today at the show rooms of the Moon Motor Car Co. of New York, distributor of Moon products for the metropolitan territory.

A specially designed Continental motor of 3 in. bore and 4¼ in. stroke (240.3 cu. in. displacement), peaking at 2950 r.p.m. and 72-hp. is used. Crankcase is cast integral with cylinder blocks, and cylinder heads are removable. Four point suspension is used. Pistons are 3½ in. long and have three 3/16 in. rings above the pin. Intake valves are 1 7/16 in. and exhaust valves are 1 5/16 in. All have 5/16 in. lift.

Morse chain drive is used on the front end. Oil pump is outside the right side of the crankcase. Pressure feed is used to lubricate main, crankshaft and camshaft bearings. Water pump is located on the front end of the cylinder head. Ross steering gear, Stromberg carbureter, Hotchkiss drive, Delco ignition, and four wheel Lockheed external brakes are used. Emergency brake is on the transmission. The frame is braced by a tubular cross member at both front and rear. A winter front is standard equipment.

The new line contains six models. The roadster and touring car are listed at $1,895. The standard sedan is priced at $1,995. The cabriolet roadster and the brougham sell for $2,095 and the deluxe sedan is listed at $2,195.

Changes in Duties on Exports to Poland Made

WASHINGTON, June 18—Important changes in Polish duties on American automotive products and other commodities are brought about by the revised commercial treaty between France and Poland, signed at Paris last December, and just ratified, according to a cablegram received here by the Department of Commerce from Commercial Attaché Leighton W. Rogers at Warsaw.

By virtue of the new treaty France is granted, in addition to most-favored-nation treatment, more extensive reductions in the Polish tariff than provided in the treaty of 1922, in return for which Poland is to receive French minimum and intermediate rates of duty on a larger number of articles than provided for in the former treaty.

Compared with the former schedule of Polish conventional duties the changes affecting automotive products are: Larger conventional reductions — Automobiles weighing from 700 to 1100 kilos. Smaller conventional reductions—Automobiles less than 700 or more than 1500 kilos. New conventional reductions established—Tires and tubes; parts of vehicles including automobile chassis and bodies.

SCHEUER RESIGNS FROM KELLY-SPRINGFIELD CO.

NEW YORK, June 17 — A. L. Scheuer, president of the Kelly-Springfield Tire Co., has sent his resignation to the board of directors with a request that it be accepted not later than October 1. It is reported that Samuel Woolner, Jr., will succeed him.

According to the announcement, Mr. Scheuer for some time had wished to retire, but not while the tire industry was in difficult times. The change of conditions for the better during the past year, it was said, caused him to resign in order to enjoy a long-deferred holiday.

Motor Traffic Affects Taxes on Realty Values

WASHINGTON, June 17—Effect of motor traffic on property values is recognized in a decision just reached here by the Board of Tax Appeals. This decision is expected to have a far-reaching effect on Federal taxation in many cities.

The board held that motor traffic must be considered an important factor in weighing property values. Where the value of stores is lessened through their inaccessibility to the motoring public, this constitutes a legal deduction from the gross income of the owners for taxation purposes. The board held that the obsolescene of buildings, due to the swift changing of business centers common to American communities, also constitutes a legal deduction. The decision was reached in a Chicago case, but it was described as applicable to other cities.

Advertising Men Meet

(*Continued from page* 1078)

by examples that a manufacturer who induces his wholesalers, retailers and their salesmen to cooperate with him in his advertising and selling effort can either cut down his advertising costs and get the same results as he obtained without this cooperation or get more business with the same advertising costs.

George H. Bird, president of the Bird-Sykes Co., Paige-Jewett distributor in Chicago, addressed the conference on dealer advertising, and Benjamin Bills of Chicago gave a psychological analysis of the successful steps in advertising and selling.

Cooperation of the associations was worked out by John C. Long and Neal G. Adair.

April Figures Show Gain in Tire Output

Rubber Association Gives Data on Production—Increase Over Last Year

NEW YORK, June 16—Production of high pressure cords for the month of April was 1,816,641; of balloons, 1,626,369; and of fabrics, 562,449, or a total of 4,005,459, according to figures released by the Rubber Association of America. This compares with a total of 3,956,931 for March. As these figures represent 75 per cent of the industry, the April production total for all would be 5,340,612.

Balloon tire production increased by 409,002 over March, while high pressure cords decreased by 184,298 and fabrics by 176,176. In April, balloons made up 40.6 of the production while in March they represented only 30.7 per cent.

Tube production ran 3,259,524 for high pressure and 1,879,007 for balloons during April, or a total of 5,138,531. In March, total production was 5,250,122. For the whole industry April production would be 6,851,341.

Manufacturers' inventories of high pressure cords were highest in March, totaling 4,369,673, but declined to 4,035,061 in April. Balloon inventory reached a new high of 1,080,594 in April, while fabrics receded somewhat to 1,700,699.

Moto-Meters Co. Wins Decision Against Kwast

NEW YORK, June 17—According to Edwin P. Grosvenor, attorney for the Moto-Meters Co., the decision of Justice Velente directing a verdict of $1,323.70 damages in the company's action for fraud against Anton P. Kwast, establishes the principle that it is fraud to obtain a special commission or discount on the false representation that special services will be given, if the services are not given or intended to be given.

The company charges that it gave Kwast a special commission for representing that he would create a market for the company's product in Java, and that soon after the goods were delivered to him they were turned over to purchasing agents for resale in the United States at cut prices.

VALSPAR PLANT IS ENLARGED

SOUTH KEARNY, N. J., June 15—Valentine and Co. is adding to its plant a large packing and shipping building, a building for digesting, filtering and storing nitrocellulose solutions, and a nitrated cotton storage warehouse. To increase capacity for grinding pigments for Nitro-Valspar products, the company is equipping a new building at their plant in Brooklyn with sixteen tandem water-cooled Kent mills.

Men of the Industry and What They Are Doing

Timken Company Changes

Herman Ely, vice-president and treasurer, has retired from active connection with the Timken Roller Bearing Co., Canton, Ohio. He has not announced his plans for the future. H. J. Porter is advanced from general sales manager to vice-president in charge of sales. Elliott A. Allen has been appointed manager of sales in New England territory and L. M. Klinedinst, formerly assistant to Porter, has become general sales manager of the industrial division.

Norton Wins Medal

Charles H. Norton, consulting engineer of Norton Co., Worcester, Mass., was awarded the John Scott Medal at the University of Pennsylvania commencement exercises. This medal is awarded for exceptional achievements in mechanical arts. Mr. Norton received the honor because of his invention of accurate grinding devices of high power. His grinding machine inventions have played a large part in automotive production.

Hannum to Make Parts

George H. Hannum, former president and general manager of the Oakland Motor Car Co. and of the Saginaw Products Co. of Milwaukee, has formed the Hannum Manufacturing Co. in that city. He has taken over the plant and business of the Lavine Gear Co. and will manufacture motor parts, specializing on the Hannum steering gear, particularly adapted, it is said, to balloon tires and heavy duty trucks.

House Manages Detroit Branch

W. L. Rowe, Inc., New York City, Eastern representative of the Cleveland City Ford and Iron Co., has opened a branch in Detroit, with offices in the General Motors Building. This branch is in charge of G. A. House, formerly general sales manager of the Hayes Wheel Co. of Jackson, Mich. He will handle Cleveland City Ford and Iron Co. sales in Michigan and part of Ohio.

Gray Plans Expansion

Emmett P. Gray has taken control of the Gray-Hawley Manufacturing Co. and is making plans for expansion. The company manufactures everything for the control of the exhaust from the motor manifold to the extreme rear of the car, including the heating system. The company recently sold the patent rights of its new heater and muffler to the AC Spark Plug Co. of Flint.

Ayr Assistant Factory Manager

David Ayr has become assistant factory manager of the Pratt & Whitney Co., manufacturers of machine tools, Hartford, Conn. He was formerly connected with the American Radiator Co., Buffalo; the Russell Gear & Machine Co., Toronto; the Gurney Ball Bearing Co., Jamestown, N. Y.; the Pierce-Arrow Co., Buffalo, and the Brown & Sharpe Co., Providence.

Beckett Incorporates

After operating for four and a half years as an individual, W. J. Beckett of Columbus, Ohio, has incorporated the Beckett Tire & Supply Co. to manufacture and sell tires and automobile accessories at 946 N. High Street. The incorporators also include R. B. Perry, J. C. Williamson, A. R. Hedington and N. S. Monsarrat.

Wicks Goes to Boston

The New England Velie Co., Boston, has appointed Arthur J. Wicks as sales manager for the Boston zone. He was formerly associated with the Cadillac Automobile Co., Boston, with the New England Oldsmobile distribution, the Cadillac Automobile Co., St. Louis, and the Cadillac Automobile Co., Quincy, Ill.

Briggs-Brown Changes

W. N. Noble, who has had charge of the used car department of the Briggs-Brown Motor Co., Dallas, Tex., has been assigned to the promotion department of the Willys-Overland Co. Lindsay Joliff has succeeded him at the Dallas office of the Briggs-Brown Co., which distributes Willys Knight-Overland cars.

F. W. Fenn Joins Standard

Frederic W. Fenn has been appointed district sales manager of Eastern Atlantic Coast territory by the Standard Motor Truck Co., Detroit. Mr. Fenn was for five years secretary of the truck committee of the National Automobile Chamber of Commerce.

Bradford Is Vice-President

C. C. Bradford has been elected vice-president of the Eaton Axle & Spring Co., Cleveland. He was with the United States Light & Heat Corp., Niagara Falls, N. Y., for several years and has also represented Young Bros. Co., Detroit.

Barnes Is General Manager

H. L. Barnes has been elected general manager of the American Forge & Machine Co., Canton, Ohio. He was formerly with the Whitman & Barnes Manufacturing Co. H. C. Haight remains as treasurer of the former company.

Fullam and Slomer Abroad

E. J. Fullam, secretary and treasurer, and W. F. Slomer, general sales and service manager of the Fellows Gear Shaper Co., Springfield, Vt., are on a business tour of Europe, returning in August.

Perkins and Jones Resign

William E. Perkins, president and general manager, and George E. Jones, secretary-treasurer of the Mt. Vernon Rubber Co., Mount Vernon, Ohio, have resigned from the organization.

Munz Buys Partner's Interest

Christian A. Munz, one of the founders of the Kansas City Auto Spring Co., has bought the interest of his partner, John R. Mousley, and plans to enlarge the plant.

Brewer Resumes Practice

Robert W. A. Brewer has resigned as president and chief engineer of the Engineers' Development Co. and will continue his consulting practice at Ridley Park, Pa.

Miller and Gar Wood to Make Marine Engines

DETROIT, June 15—Harry Miller of Los Angeles, designer of racing automobiles, and Commodore Gar Wood of Detroit, famous as a speed boat builder and pilot, have formed the Wood-Miller Marine Engine Co. to manufacture marine engines.

Three engines will be built, one having 215 cu. in. displacement, to be used in speed boats; another of eight cylinders, having a 91½ cu. in. displacement, for light runabouts; and the third, a four-cylinder outboard engine for small boats.

Marketing will be done by the Wood-Miller Co., with headquarters in Detroit, with construction in Los Angeles, where Mr. Miller has his manufacturing plant. Construction will be similar in design to the engines used in Miller-built racing cars.

Oakland Better Sales School Series Is Held

DETROIT, June 16—Representatives of the sales development department of the Oakland Motor Car Co. have begun a nation-wide tour among Oakland dealers to conduct courses in better merchandising. This series of two-day schools will be continued until the last of September, when all Oakland dealers are expected to have been covered. The schools earlier this year were held in the larger cities and lasted a week. The present series is brought to the "front doors" of the dealers. The main purpose is to help dealers train their salesmen.

2,631,690 CARLOADS IN 1924

CHICAGO, June 16—According to figures issued by James S. Marvin, assistant general manager of the National Automobile Chamber of Commerce at the recent Mid-West Transport Conference here, 2,631,690 carloads of freight were contributed to the railroads by the automobile industry in 1924, including 740,578 carloads of motor vehicles and 50,000 carloads of tires.

Coming Events

SHOWS

Sept. 14-19 — Cleveland, Public Auditorium, Annual Convention and Exposition, American Society for Steel Treating, W. H. Eisenman, secretary.

Sept. 21-26—London, England, Annual Cycle and Motorcycle Show under auspices of the British Cycle and Motorcycle Manufacturers and Traders Union, Ltd.

Sept. 28-Oct. 3—Chicago, Fourteenth annual Safety Congress and Exhibit, Rainbow Room, Hotel Winton, under direction of National Safety Council, A. M. Smith, business manager.

Oct. 5-9—Atlantic City, Young's Million Dollar Pier, Manufacturers' Exhibition in connection with American Electric Railway Association Convention.

Oct. 8-17—London, Olympia passenger car show.

Oct. 29-Nov. 7—London, annual truck show.

Nov. 26 - Dec. 6 — Berlin, Germany, Annual Automobile Show in the Kaiserdamm.

CONVENTIONS

June 16-19—White Sulphur Springs, Greenbrier Hotel, Summer meeting of Society of Automotive Engineers.

June 22-27—Summer Convention of the Automotive Equipment Association at the Broadmoor Hotel, Colorado Springs, Colo.

June 24-26—Seattle, National Foreign Trade Council Convention.

Sept. 14-19 — Cleveland, Public Auditorium, Annual Convention and Exposition, American Society for Steel Treating.

Oct. 5-9—Atlantic City, Young's Million Dollar Pier, American Electric Railway Association.

Oct. 7-10—Montreal, Motor and Accessory Manufacturers Association Convention.

RACES

June 20—Baltimore-Washington Speedway, Laurel, Md.

July 26—Paris, Montlhery Track, French Grand Prix.

Sept. 7—Altoona, Pa.

Sept. 19—Syracuse, N. Y.

Sept. 30—Fresno, Cal.

Oct. 10—Baltimore-Washington Speedway, Laurel, Md.

Oct. 24—Charlotte, N. C.

Nov. 26—Los Angeles.

S.A.E. MEETINGS

National

June 15 - 19 — Summer meeting of the Society of Automotive Engineers at White Sulphur Springs, W. Va.

Sept. 15-16—Production meeting and exhibition.

Sept. — Automotive Transportation meeting.

Nov. — Service Engineering meeting.

Studebaker Plans to to Produce Buses

SOUTH BEND, IND., June 18—Studebaker announces that it has actively entered the bus field. Two special bus chassis units have been designed and will be placed in production in July.

This entry into the bus field has been caused by the fact that many of the Big Six Studebaker passenger chassis have been equipped with bus bodies and have given excellent service in that work.

The power plant of the new design is the same as that used on the Big Six—L-head type engine cast en bloc with removable head, 3⅞ in. bore, 5 in. stroke, rated at 75 hp. Pistons are cast iron. A fully machined crankshaft is carried on four bronze backed bearings.

Model A-158, which seats 12 to 15 passengers, has 7 1/16 in. deep side frame members, of 3/16 in. steel, with 2¼ in. flanges. The seven regular frame cross members are supplemented by a 3½ in. tubular cross member.

Model A-158 has 158 in. wheel base. Factory list price is $1,785. The larger model has 184 in. wheel base and lists $2,150 at the factory. Bodies will not be built by Studebaker but will be obtained from an outside source.

Model M-184, seating from 15 to 20 passengers, has flanges 3 in. wide, and side frame 8 in. deep at the center with a 4½ in. channel beam running 40 in. beyond the rear axle. Supplementary bracing for the larger model consists of two 3½ in. tubular cross members at the center and a 2½ in. tubular cross member at the rear.

The gear ratio on both models is 4.7 to 1. Spark advance is automatic. Full control of lighting system is on steering wheel. The radiator is the regular Big Six type with hood and dummy cowl. Standard equipment includes front bumper, extra wheel, tire and tube, motometer, combination stop and tail light and inspection lamp. Instrument board is equipped with clock ammeter, speedometer, oil gage, gasoline gage, and brake pressure gage.

FORD SALES CONTINUE STEADY DURING MAY

DETROIT, June 16—Continuation of a good domestic demand for Ford cars and trucks during May is shown by sales figures just released by the company. The last ten days of May show a substantial increase over the previous ten days.

Foreign sales of Ford cars and trucks exclusive of Canada established a new record with 19,576 sales, 1100 above the high mark for April sales. The total number of Ford sales during May amounted to 201,779.

Lincoln sales in the United States during May amounted to 968, exceeding by 50 the number for April.

Dutch Rubber Aid Is Sought in Crisis

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tires will be made only for specially designed wheels.

Production is expected to be slowed down further by the postponement of spring dating business, elimination of cheap second quality tires, and the greater use of reclaimed rubber in manufacturing operations.

If a decline in the crude rubber market is brought about as a result of the association's action, it is believed there will be no necessity for further tire advances, and hundreds of thousands of dollars will be saved for American motorists.

Although a shortage in crude rubber has been widely advertised, one manufacturer in close touch with the situation, and usually correct in his views, said he believed there soon would be plenty of rubber for manufacturing purposes in this country. His view is that the price has been artificially boosted by heavy buying.

Better Business in Next Half Year Seen

WASHINGTON, June 17—Data contributed by members of the National Association of Credit Men at their thirtieth annual convention here this week forecasts better business during the balance of 1925 for 76 per cent of the seventeen trade groups represented, which covered motor vehicles, auto supplies and other leading lines of American business.

Prospects for business during the next three months were reported as follows: better, average 59 per cent; stationary, average 34 per cent; worse, average 7 per cent. Prospects for business during the next six months: better, average 76 per cent; stationary, average 20 per cent; worse, average 4 per cent.

Dr. Frank A. Fall, director of Education and Research of the Association, called attention to the very favorable showing made by the reports on prospects for business during the coming six months.

Of the 300 members who contributed to the investigation, 96 per cent believed that conditions during the coming six months will be at least as favorable as they are now, and only four per cent anticipated poorer business.

Collections for May, 1925, compared with May, 1924, were reported as follows: better, average 66 per cent; stationary, average 25 per cent; worse, average 13 per cent.

Hill Co. to Change Name Again

CHICAGO, June 16—When the name of the Hill Pump Valve Co. was recently changed to the Hill Manufacturing Co., the Secretary of State advised that there was no corporation by the latter name. It has since been learned that there is an unincorporated company in Chicago by the latter name. Hence a special meeting of the stockholders has been called on June 25 for the purpose of submitting the question of changing the name to the Hill Products Corp.